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# Comparison of Telephone and Keyboard Conversation
# 電話対話と端末間対話の比較

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*Abstract*

The distinctive features of telephone and keyboard conversations are clarified through analysis of simulation data. Keyboard conversation is shown to have the same fundamental features as telephone conversation, except for stammering, correction, and interjections indicating agreement. Both types of conversation have similar ways of expressing intention characteristic of conversation, and structuring discourse in terms of the 'discourse segment' (Grosz & Sidner 1985). The result of the research justifies a study of keyboard conversation as an approximation of telephone conversation.

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## Contents

## 1. Introduction

Natural language understanding research has previously focused on understanding newspaper articles and stories and natural interfacing in question answering systems. There have been few attempts to automatically understand or translate more flexible human speech communication such as telephone conversation. Linguistic phenomena are left unexplained in such areas, not to mention unsolved theoretical problems.

There has been little research on how the nature of conversation differs from one communication media to another. The most significant research in this area was by Cohen (1984) and by Cohen & Fertig (1986), who analyzed and compared human conversations about assembling of air pumps by means of telephone and computer terminals. In these studies, however, one partner gave assembly commands and checked on existing conditions and parts. Other partner limited himself to "yes", "no", "OK" and the like. The dialogue did not take place between equals. The speakers were trained to respond as a computer would.

This report undertakes analyze of conversation between equals, which is regarded as a prerequisite for human conversation processing. Beacuse everyday conversation is too complicated to analyze fully, a single, rather limited topic was taken up. By comparing telephone and inter-terminal (keyboard) conversations on the supecific topic, it is shown that keyboard conversation has all the basic characteristics of telephone conversation. Thus, a study of keyboard conversation as an approximation of telephone conversation is justified.

## 2. Collection of Telephone and Keyboard Conversation Data

Conversation data was collected under the topic of "inquiries regarding an international conference" using a Japanese, an interpreter whose mother tongue is Japanese, and an American. The Japanese played the role of the inquirer and the American played a member of the secretariat for an international conference. Both parties were handed a "Call for Papers" for a hypothetical international conference. The method of recording the telephone conversation was that used by Iida et al. (1987). The telephone conversation was picked up by a microphone and recorded on tape, while the keyboard conversation was recorded in the form of half-duplex transmission. Messages were sent by pressing a transmission key. Also input could be revised prior to pressing the transmission key. Input and output were written in the Roman alphabet (Romaji) and the previous conversation remained on the display screen.

In the following passages, telephone and keyboard conversations of the utterances in Japanese by the inquirer and the interpreter are compared. "Utterance" is defined here as a stretch of speech by one speaker. The volume of Japanese data collected is as follows.

| | Telephone Conversation | Keyboard Conversation |
|---|---|---|
| Total Number of | | |
| · Conversations | 14 | 12 |
| · Utterances | 805 | 222 |
| · Sentences | 1,135 | 358 |
| · Words | 11,598 | 3,092 |

The relative frequency of parts of speech, distance between deictic expressions and their referents, and depth of embedding in telephone and keyboard conversations were compared. However, these do not provide any direct characterization of the conversations. Note that the two types of conversation coincide well in relative frequency of parts of speech, both full words such as nouns, verbs and adjectives, and function words such as postpositions and auxiliaries (see Table A-1).

Table A-2 shows that in both types of conversation most embedded expressions were singly embedded and none was deeper than triply embedded. The interpreter used more deeply embedded expressions than the inquirer. It is believed this is because that the interpreter's Japanese tended to be influenced by the style of the English speaker.

Table A-3 shows that the distance between anaphoric expressions and their referents was, for the most part, within two utterances in both types of conversation.

Table A-4 indicates that utterances tend to be longer in telephone conversation than in keyboard conversation, except for one-word utterances characteristic of telephone conversation like "*hai*", which indicates agreement.

## 3. Comparison of Telephone and Keyboard Conversations

The functional difference in the telephone and keyboard as media manifests itself as a difference between telephone and keyboard conversations. However, as their objectives remain the same, there is believed to be no difference in the basic elements of the two conversations.

The differences in the telephone and keyboard as media can be reduced to the three categories shown in Table 1.

Table 1 Comparison of Telephone and Keyboard Functions

| | Telephone | Keyboard |
|---|---|---|
| Simultaneity | ○ | x |
| Corrigibility | x | ○ |
| Recordability | x | ○ |

(1) Simultaneity: Whether the utterance is transmitted when it is spoken or typed.
(2) Corrigibility: Whether the utterance can be corrected before it is transmitted .
(3) Recordability: Whether past conversations can be referred to.

Among the common elements of the conversations are those pointed out by Iida et al. (1986), such as discourse-segmenting signals signifying the beginning of, ending of, or response to conversations, semantic interpretation depending on the prevailing situation, ellipsis designed to maintain smoothness of conversation, intention expressions using idioms characteristic of telephone conversation, discourse structure as pointed out by Grosz & Sidner (1985), and clue words indicating discourse segmentations.

In the following passages interjections, substitution, stammering, and rephrasing anticipated to be dependent on whether the communication media is simultaneous and/or corrigible, and repetition dependent on recordability will be compared. Whether discourse segmentation, situation-dependent semantic interpretation, ellipsis, intention expressions, discourse structures and clue words are different, depending on the media, will also be investigated.

### 3. 1. Interjections

In the telephone conversations, 27 interjections totalling 883 words (7.6% of total words), such as "*ano*"(182), "*anoo*"(182), "*eeto*"(92), "*eetto*"(87), "*to*"(46), "*ee*"(38), "*aa*"(29), and "*eto*"(26) were noted. (The numerals in parentheses denote the number of times the expression was used.) These are all variations of the English "er" or "uhm" used when groping for a word. In contrast, in the keyboard conversations, only one, "*aa (soo desuka)*"(1), was recorded.

Frequent use of interjections in telephone conversation arise from spontaneity, because, on the telephone, what was said must be understood and responded to immediately after an utterance is finished. Interjections are needed both to gain time to understand and to phrase a reply(See Figure 1).

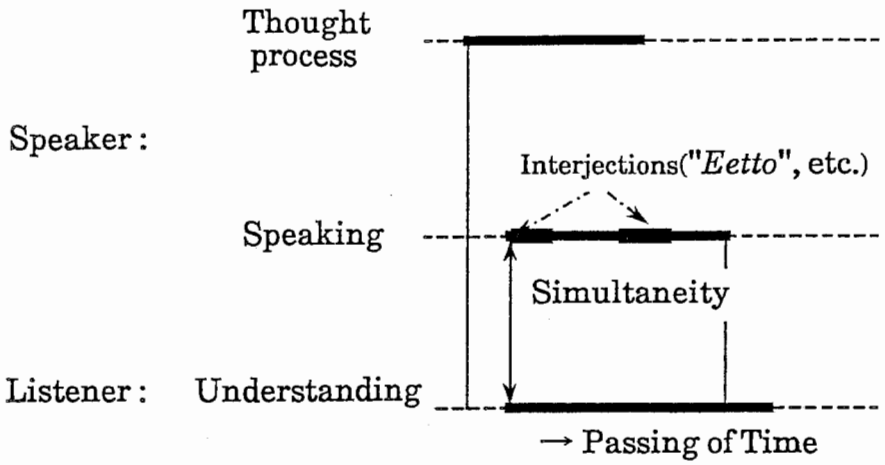


Figure 1 Timing of a Telephone Conversation

### 3. 2. Substitution, Stammering, and Rephrasing

(1) Substitution

Substitution is defined as expressing the same referent with different words. Telephone conversation data provide the following examples.

・"*soko kara, Kita-ooji eki shuuten kara* "
there from Kita-ooji station from
From there, from Kita-ooji Station terminal

・"*sore wa , [ano] hensou no kijitsu toiu no wa.....*"
that [Er] return date
That---[Er]--The date for returning is.....

・"*basu, kankou-basu wa.....*"
bus sightseeing bus
The bus, the sightseeing bus .....

The symbol '・' denotes an utterance by the interpreter. Brackets '[]' denote an interjection.

In the examples above, simple anaphoric expressions (pronouns or short noun phrases) are replaced a moment later with full noun phrases which can be more easily identified by the listener.

There were no examples of substitution in keyboard conversation.

(2) Stammering

Stammering is a repetition of a small part of an utterance. Telephone conversation data provided the following examples. (The words in parentheses denote stammering.)

"(*sono*) *sono naka*"
there there in
(there) in there

"(*sanka*) *sankasuru baai no .....*"
participate participate case
When (participating) participating.....

There were no examples of stammering in keyboard conversation.

(3) Correction

Correction is rewording, changing the structure of an utterance. The following examples were observed in telephone conversation. (The words in parentheses denote correction.)

".....~ *ni* (*narimashite, ....*) *narimasu.*"
become, and..... become
(become ~ ,and....) become ~ .

There were no examples of correction in keyboard conversation.

The differences outlined in (1) through (3) are believed to be due to the media difference. In keyboard conversation, while it is possible to change an utterance before it is sent, in telephone conversation it is not.

3. 3. Repetition

In telephone conversation, where it is at times difficult to hear what is said, or where there is danger of misunderstanding important numbers, addresses, full names, etc. are often repeated. There are also occasions when numbers or other information which have been understood are repeated simply for confirmation.

Example (telephone conversation)

B: *kijitsu wa 1987nen 6gatsu no tsumori desu*
(The date is scheduled for June, 1987)
A: *1987nen 6gatsu desu ne ?*

(That's June, 1987 ?)

Example (telephone conversation)

B: *denwabangou wo moushiagemasu. Kyouto no shigai-kyokuban ga 075,*
(I will give you the telephone number. The area code number for Kyoto is 075.)

A: *hai*
(Yes.)

B: *781no*
(781 )

A: *hai*
(Yes.)

B: *4141*
(4141)

A: *4141*
(4141.)

B: *sono toori desu.*
(That is right.)

A: *075 no 781 no 4141 desune?*
(075-781-4141, isn't it?)

B: *sono toori desu.*
(That is right.)

In keyboard conversation, prior conversation remains displayed and there is no need for repetition. Nevertheless, repetition has appeared in the experiments. However, this is somewhat different in nature from repetition in telephone conversation. In keyboard conversation, repetition occurred when an utterance differed considerably from what was expected and required confirmation. In these cases, repetition alone was insufficient and certain additions in the form of conditions or interrogation such as "[*hontoo ni*] ... *desune? / desuka?*" (is that [really] so?) were made.

Example ( keyboard conversation)

A: *tourokuryou wa o-ikura desu ka ?*
(How much is the registration fee ?)

B: *amerika-doru de 100 doru desu.*
(100 dollars U.S.)

A: *yen de o-shiharai shite mo yoroshii deshouka ?*
(Can this also be paid in Japanese yen ?)

B: *moushiwake arimasen ga, doru de o-negai shimasu.*
(I'm sorry. This must be in U.S. dollars.)
A: *3 nichi-kan tooshite 100 doru desune?*
(So that would be 100 dollars for 3 days ?)
B: *hai, hoteru dai to shokuhi wa hukumarete orimasen.*
(Yes. Hotel room charges and meals are not included.)

### 3. 4. Utterance Segmentation Signals

As beginning signals, the interjections "*ee*", "*a*", "*ano*" and the like appeared in telephone conversations, but not in keyboard conversations.

The response signal, "*hai*", signifying agreement, appeared most frequently in telephone conversation but not at all in keyboard conversation. The words "*soo desuka*" (Is that so?) and "*wakarimashita*" (I understand), signifying that what was said had been fully understood were seen in both types of conversations. Table 2 shows the frequency of the main response signals. Percentages in this Table are the number of times the signals appeared, divided by the number of conversations.

As concluding signals, the sentence-final particles "*ka*" and "*ga*" appeared in both types of conversation. These function at the same time grammatically to show repetition and the speaker's intention, respectively. Table 3 shows the frequency of concluding signals. The frequency percentage in this Table is the number of times the signals appeared, divided by the number of conversations.

Table 2 Frequency of Main Response Signals

| Main Response Signals | Frequency(%) | |
|---|---|---|
| | Telephone C. | Keyboard C. |
| *Hai* | 30.9 | 0.0 |
| *Sodesuka* | 9.5 | 4.1 |
| *Wakarimashita* | 5.6 | 8.6 |

Table 3 Frequency of Concluding Signals

| Main Concluding Signals | Frequency(%) | |
|---|---|---|
| | Telephone C. | Keyboard C. |
| *Ka/Ka?* | 18.0 | 39.6 |
| *Keredo(mo)* | 1.9 | 0.0 |
| *Ga* | 1.0 | 5.0 |

The difference in the frequency of beginning signals and the response signal "*hai*" is because the beginning and end of the conversation in keyboard conversation can be judged from the display. The beginning and end of a message can be clarified by pressing the transmission key. Because transmission is believed to be a unit of utterances, the signal of agreement "*hai*" is, in principle, not necessary. The response signals in keyboard conversation are used to indicate undestanding of what was said, and the concluding signals used to interrogate or to clarify intention.

### 3. 5. Interpretation of Meaning Depending on the Situation

"*O-negai shimasu*" (I request of you) and "*wakarimashita*" (I understand) are expressions whose interpretation depends on context. Use of these expressions is about the same in both telephone and keyboard conversation. "*O-negai shimasu*" is dealt with in Section 3. 7., where idioms used as intention expressions are discussed.

(1) Accepting a Request

In this case, several options have been offered, a choice made and "*wakarimashita*" uttered. Here "*wakarimashita*" means acceptance of the partner's choice.

Example (keyboard conversation)

B: *dewa, o-shiharai houhou wa dou saremasuka ?*
(How do you plan to pay?)

A: *soudesune, kawase de o-negai shitai nodesuga.*
(Let me see, I would like to use a money order.)

B: *Wakarimashita*
(That would be fine)

(2) Indicating Understanding of an Explanation

Here, "*wakarimashita*" is a response to an affirmative answer and additional information in reply to a request for confirmation. Here the expression means understanding that which has been said.

Example (keyboard conversation)

A: *3 nichi-kan tooshite 100 doru desune ?*
(It's 100 dollars for the entire three days, isn't it ?)

B: *hai, hoteru dai to shokuhi wa hukumarete orimasen.*
(Yes. Hotel and meals are not included.)

A: *Wakarimashita*
(I understand).

3. 6. Ellipsis

In spoken Japanese discourse, "old information" and information as to who fall to predicate arguments are often not expressed in the surface discourse. Topic, marked by postposition "*wa*", can serve to identify most omitted noun phrases. Deictic verb phrases and Japanese honorific expressions can restrict candidates for human case noun phrases. This omission, or "ellipsis", was found in both telephone and keyboard conversations data.

There was a difference in the way postpositions and topic were omitted in the two types of conversatioin. In telephone conversation, there were a number of case postpositions omissions, such as "*ga*" (nominative case marker), "*wo*" (accusative case marker), and "*ni*" (dative case marker). This was seldom so in keyboard conversation.

Example (telephone conversation)
"*saito-shi-ingu no puroguramu* (__), *ikura gurai ka wakari masu deshou ka*"
("Can you estimate the costs of the sightseeing program ?")

In telephone conversation, topics mentioned previously were expressed through pronominal noun by each speaker in turn. In keyboard conversation, repeated topic were omitted more frequent.

Example (telephone conversation)
A: *tourokuryou wa o-ikura desuka ?*
(How much is the registration fee ?)
B: *tourokuryou wa 16,000 yen desu.*
(The registration fee is 16,000 yen)
A: *sore wa, watashi, gakusei nandesukeredomo, gakuseiwaribiki wa naindesuka ?*
(I happen to be a student. Is there any student discount for this ?)

Example (telephone conversation)
B: *tourokuhiyou wa 16,000 yen de, kore wa genkin matawa kogitte de o-shiharai kudasai.*
(The registration fee is 16,000 yen and we request you pay this in cash or by check.)
A: *kore wa ippan sankasha mo daigaku kankeisha mo onaji ryoukin deshouka?*

(Is this the same for general participants and for university faculty personnel ?)

Example (keyboard conversation)

A: *tourokuryou wa oikuradesuka ?*
(How much is the registration fee ?)

B:(__)*amerika doru de 100-doru desu*
( A hundred dollars U.S.)

A: (__)*yen de o-shiharai shitemo yoroshiideshouka*
(Can this be paid in yen ?)

B: *moushiwakearimasenga* (__)*doru de onegaishimasu*
(Sorry. We must request payment in dollars.)

A: (__)*mikka-kan tooshite 100-doru desune*
(Is it 100 dollars for all three days ?)

B: *hai,* (__)*hoterudai to shokuhi wa hukumareteorimasen*
(Yes. Hotel room charges and meals are not included.)

A: *Wakarimashita*
(I understand).

### 3. 7. Idioms Indicating Intention

In telephone conversation, there is frequent use of circumlocution without clearly conveying intention, such as "*no desu ga*" as in "*...tai no desu ga*" (I would like to...) and "*no de*" as in "*...tai no de* " (desirous of). These were originally conjunctive particles, but are now used to soften intentions rather than actually form subordinate clauses. This way of expressing intention, again characteristic of spoken Japanese discourse, was seen in keyboard conversation also.

Example (keyboard conversation)

A: *watashi wa eigo ni jishin ga nainodesuga, tsuuyaku wa hairunodeshouka*
(I am none too confident about my English language skills. Will interpreters be present ?)

B: *go-kibou ni yotte tsuuyaku ga hairimasu. kaigino ooku wa nihongo de okonawaremasu shi*
(If you should desire, there will be interpreters available. But the major portion of the Conference will be in Japanese.)

Example (keyboard conversation)

A: *sankaryou wa ginkouhurikomi desuka ?*
(Can the registration fee be remitted directly to a bank account ?)

B: *kurejitto-ka-do no houga yoinodesuga*
(By credit card would be better .)

Example (keyboard conversation)
A: *kaijou de tsuuyaku wo tanomemasuka ?*
(Can interpreters be requested?)
B: *hai, dekimasu ga*
(Yes, they can.)

The expression "*o-negai shimasu*"(I request of you) at the end of a dialogue was observed in both telephone and keyboard conversations. This usage can be classified into the following three categories.

(1) (Noun Phrase) + (Case Postposition) + '*o-negai shimasu*'
This is further divided into the following two subcategories.

(1-1) A form in which the main verb has been omitted.
This occurs primarily with case postposition "*de*", the instrumental case marker. The verb omitted differs according to the situation.

Example (telephone conversation)
*Genkin moshikuwa kogitte de o-negai shimasu.*
(We would request payment either in cash or by check.)

(1-2) When asking one's partner for information
This occurs primarily with case postposition "*wo*", the accusative case marker.

Example (keyboard conversation)
*O-namae to go-juusho wo o-negai shimasu.*
(We request your name and address.)

(2) (Subordinate Clause) + (Conjunctive Particle) + '*o-negai shimasu*'

Example (telephone conversation)
*dewa, kijitsu madeni abusutorakuto wo o-okuri shimasu node yoroshiku o-negaishimasu*
(Then, we will send you the abstract by the deadline date. So we request that you handl it from there.)

Example (keyboard conversation)
*Kyoto roiyaru ni tsuin no heya wo hitotsu toritai node o-negaishimasu*

(We would like a twin room at the Kyoto Royal Hotel, so we request your assistance and cooperation).

In the telephone example above, it is natural to say "*...wo o-okuri shimasu (node).*" (I shall be sending you...) without adding "*o-negai shimasu*". But in the keyboard example, it would not sound natural to end with "*...wo isshitsu toritai (node)*" (we would like to reserve a room) . In the first example, there is a request that all formalities be completed after the abstract arrives. As long as the abstract arrives in time, what needs to be done thereafter is the other's responsibility . Here the degree of reliance is not great and "*o-negai shimasu*" need not to be added. In the latter example, however, the request to secure reservations is extra ordinary, and "*o-negai shimasu*" is necessary. Thus, in a context where "we may be delayed for about 3 days in sending the abstract, because we are busy", there is a request to do something which would not normally be necessary. It would not be natural to ask this without adding "*yoroshiku o-negai shimasu*".

(3) '*Hai o-negai shimasu*'
---Approval or agreement

Example (telephone conversation)
A: *watashi jaa juusho no hou wo saki ni iimashouka ?*
(Shall I, then, tell you my address first ?)
B: *hai onegaishimasu*
(Yes, I request that you do that)
Example (keyboard conversation)
A: *kuwashii koto wo oshirase itashimashouka ?*
(Shall I inform you of details ?)
B: *hai, onegaishimasu.*
(Yes, please)

There were no differences observed in the way both telephone and keyboard conversations were concluded by adding conjunctive particles or "*o-negai shimasu*" to express intention.

### 3. 8. Discourse Structure

A discourse structure model based on the "discourse segment" propounded by Grosz & Sidner (1985) was applied to Japanese, and comparisons made between telephone and keyboard conversations.

The discourse structures of both conversations have the following in common.

(1) The number per conversation

There were 4 to 8 discourse segments per conversation.

(2) The depth of nesting

The depth of discourse segment nesting was up to 3.

(3) Continuity

There were instances of discourse segment non-continuity.

An example of discourse structure of keyboard conversations is shown in Figure 2-a(in Romaji), and Figure 2-b(in English).

In the latter part of the example ("*sore kara kaigi no yokooshuu wa demasuka?*", will preliminary draft summaries be available?), the nesting structure is disrupted. Here the inquirer believes that the subject or payment of registration fees has been understood and is eager to proceed to the next subject, whereas the secretariat member believes that the payment problem has not yet been resolved. The model proposed by Grosz and Sidner (1985) is designed for a congenial conversation. A conversation with two conflicting subjects was not taken into consideration .

### 3. 9. Clue Words

Clue words and phrases appearing at the discourse segmentat were much the same for both telephone and keyboard conversations. Examples of clue words and phrases are shown in Table 4.

There will be a need to classify and compare clue words and phrases which indicate: the beginning of a discourse segment level as deep or deeper than the previous one; the simultaneous ending of a unit of discourse segments consisting of nested discourse segments ; the ending of a single discourse segment; functions independent of or dependent on context.

## 4. Relation of Telephone and Keyboard Conversation

The relation between the constituent factors of telephone and keyboard conversations is illustrated in Figure 3. Factors such as interpretation depending on the situation, intention expression through idioms, concluding signals, clue words and phrases, discourse structure, as well as some of the response signals, repetition expressions, and elliptical expressions are found both in telephone and keyboard conversations. The beginning signals, interjections, corrections, substitutions, stammering, as well as some of the response signals, repetition expressions, and elliptical expressions, which are all abundant in telephone data,

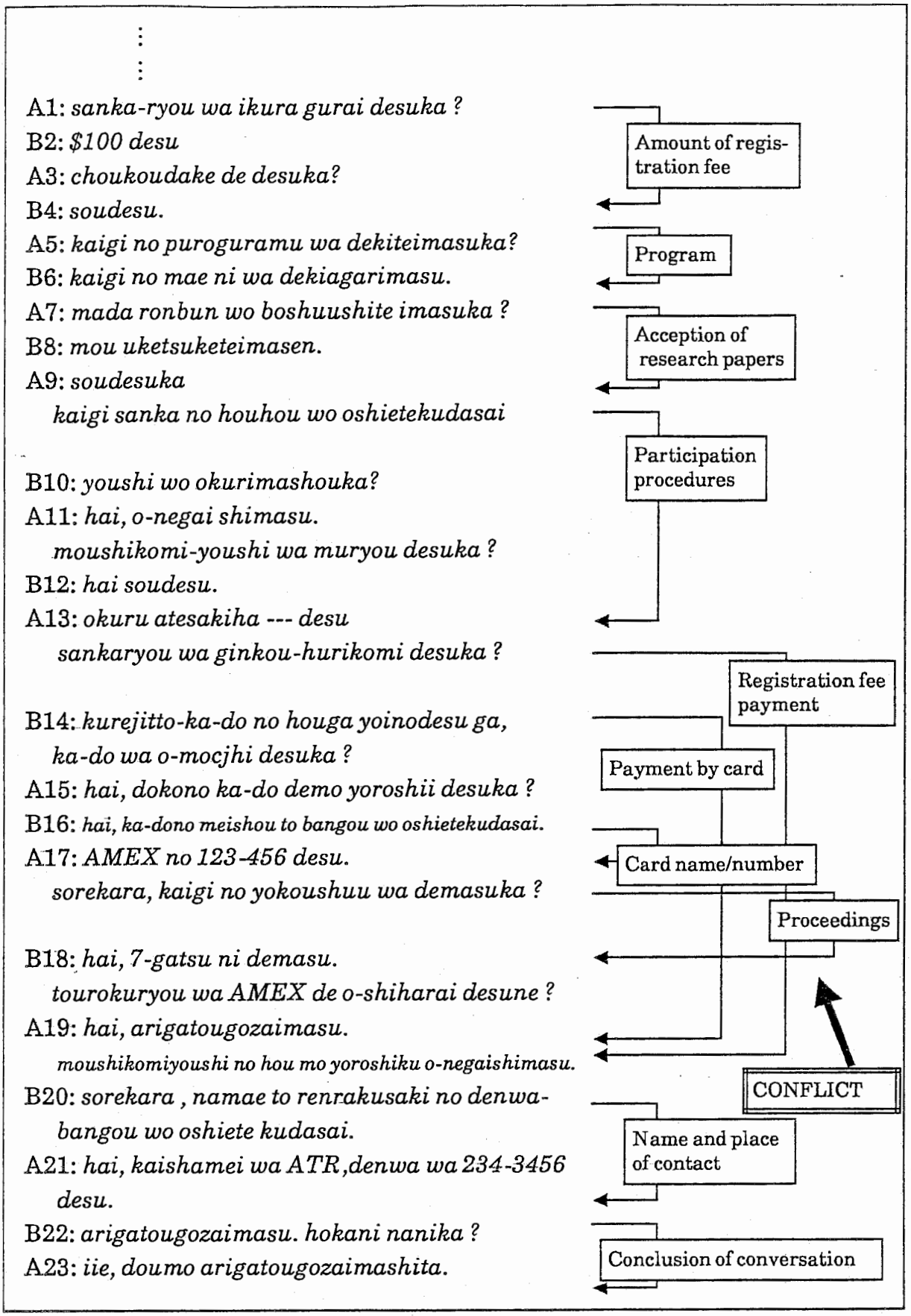


Figure 2-a Example of Discourse Structure (Keyboard conversation)

⋮
⋮

A1: About how much is the registration fee ?
B2: It is $100.
A3: Is this just to hear the lectures ?
B4: That is right.
A5: Is the Conference program completed ?
B6: It will be prior to the Conference.
A7: Are you still soliciting research papers ?
B8: We are no longer accepting them.
A9: Is that so?
What procedures must one undertake to attend the Conference ?
B10: Shall we send you application forms?
A11: Please do that.
Are they free?
B12: Yes. They are.
A13: Send them to---
Is the registration fee to be handled by bank remittance ?
B14: A credit card wold be better.
Do you have one ?
A15: Yes. Will any credit card be acceptable ?
B16: Yes. Just give me the kind of card and your number.
A17: It is AMEX 123-456.
And will preliminary draft summaries be available ?
B18: Yes, in July.
You will be making payment by AMEX card ?
A19: Yes, thank you.
Please send the application forms.
B20: Also please let us know your name and contact telephone number.
A21: Yes. The company is ATR. The phone number is 234-3456
B22: Thank you. Anything else ?
A23: No. Thank you for everything.

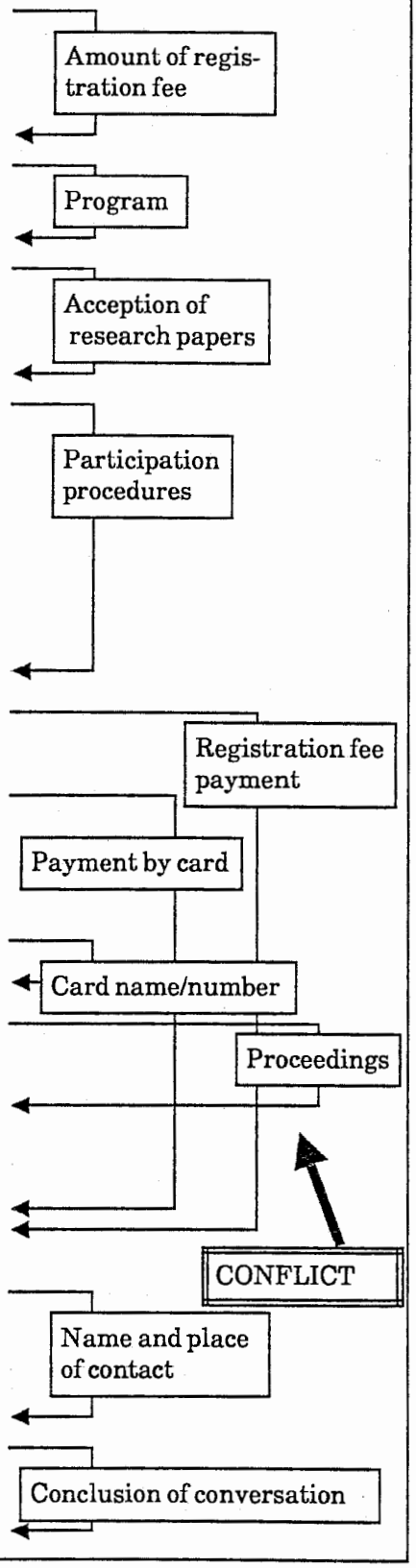


Figure 2-b Example of Discourse Structure (Keyboard conversation)

Table 4 Examples of Clue Words

| | Telephone conversation | Keyboard conversation |
|---|---|---|
| Examples of words indicating beginning of discourse segments | *Sorekara* (And then)<br>*Mazu desune / Soredewa / Soshitara / Jaa / Dewa* (all generally meaning "to begin with" or "now then"),<br>*Ato* (And also),<br>*Sakihodo* (as mentioned before),<br>*Soreto mohitotsu* (and one more thing),<br>*Saigoni*(finally),<br>*Soreto / De* (And also) | *Sorekara* (and then),<br>*Hokani nanika ?* (Anything else ?),<br>*Soredewa* (and then),<br>*Nanika hokani* (Anything else ?)<br>*Ato hitotsu* (and one more thing),<br>*Dewa* (Now then),<br>*Tokorode* (Incidentally),<br>*Hanashi wa kawarimasu ga* (On another subject) |
| Examples of words indicating ending of discourse segments | *Domo iroiro arigato gozaimashita* (Thank you for everything.),<br>*Naruhodo wakarimashita* (Yes, I now understand everything),<br>*Ah, sodesuka;*( I see.)<br>*arigato gozaimashita*<br>( Thank you for everything) | *Iroiro arigato gozaimashita* (Thank you for everything.),<br>*Dewa o-machishiteorimasu* (Well then, I shall be waiting for you),<br>*Wakarimashita,*<br>*Sodesuka* (I see.),<br>*Dewa yoroshiku o-negaishimasu* (Well, I request your consideration and assistance),<br>*Domo otesu kakemashita* (I have put you to a lot of trouble),<br>*Dewa* (Good bye). |

are not seen in keyboard conversation. Also some elliptical expressions are peculiar to keyboard conversations.

## 5. Conclusion

This report has attempted to clarify linguistic features of monitored telephone and keyboard conversations. It has demonstrated that keyboard conversation is essentially the same form of conversation as telephone conversation minus

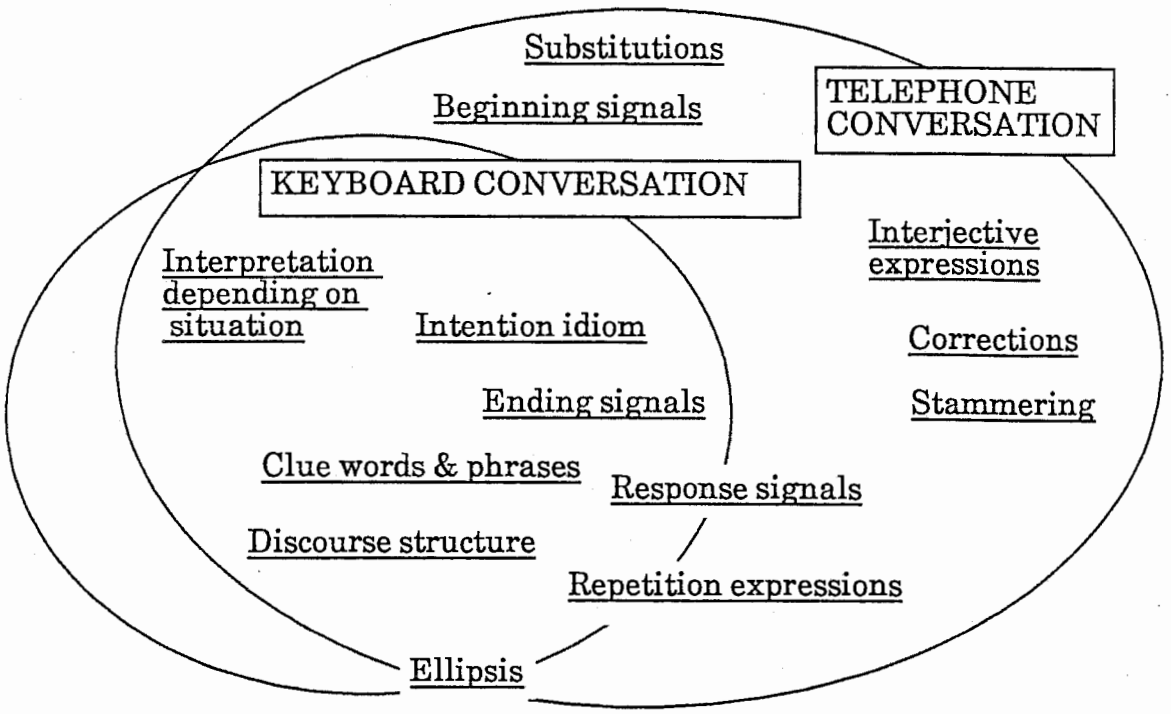


Figure 3 Relation of Telephone and Keyboard Conversations

stammering, substitution, correction, and interjections.

Future collections of conversation data must pay heed to: knowledge furnished to the participants in the tests, the level of such participants, the method of instruction, and input/output display, as well as response reactions.

Future efforts will concentrated on methods of understanding keyboard conversation as an intermediate-phase target of telephone conversation translation.

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APPENDIX

Table A-1 Relative Frequency of Parts of Speech

| Parts of Speech | Telephone Conversation | | Keyboard Conversation | |
|---|---|---|---|---|
| | Number | Frequency | Number | Frequency |
| Postpositions | 3,321 | 32.1 | 980 | 32.6 |
| Nouns | 2,139 | 20.7 | 672 | 22.4 |
| Auxiliary verbs | 1,739 | 16.8 | 530 | 17.6 |
| Verbs | 1,552 | 15.0 | 463 | 15.4 |
| Adverbs | 442 | 4.3 | 96 | 3.2 |
| Pronouns | 351 | 3.4 | 64 | 2.1 |
| Numerals | 252 | 2.4 | 90 | 3.0 |
| Attributives | 170 | 1.6 | 21 | 0.7 |
| Nominal Adjectives | 141 | 1.4 | 8 | 0.3 |
| Conjuctives | 134 | 1.3 | 39 | 1.3 |
| Adjectives | 110 | 1.1 | 43 | 1.4 |
| Exclamation | 1,247 | (Note) | 86 | (Note) |
| Symbols | 0 | (Note) | 77 | (Note) |

(Note) Exclamations including such interjections as "*Anoo*" and symbols(such as $) are characteristic of telephone and keyboard conversations, respectively. In calculating relative frequency (%), these have not been included.

Table A-2 Depth of Embedded Expression

| | Japanese national | | Interpreter | |
|---|---|---|---|---|
| | Depth 1 | Depth 2 | Depth 1 | Depth 2 |
| Telephone conversation | 116 | 2 | 167 | 10 |
| Keyboard conversation | 13 | 0 | 28 | 2 |

Here, the total numbers of relative clauses and quotation clauses were counted. There were none with depths 3 or more. Interpreters used a deeper structure than the inquirers.

Table A-3 Distance between Deixis and their Referents

| | 0U | 1U | 2U | 3U | 4U | C | E |
|---|---|---|---|---|---|---|---|
| Telephone Conversation | 130 | 181 | 53 | 2 | 3 | 6 | 159 |
| Relative Frequency(%) | 24 | 34 | 10 | 0 | 1 | 1 | 30 |
| Keyboard Conversation | 12 | 28 | 2 | 0 | 0 | 0 | 10 |
| Relative Frequency(%) | 23 | 54 | 4 | 0 | 0 | 0 | 19 |

Depending on the positioning of deictic expressions and their referents, deictic expressions were classified into anaphora ("nU" in the Table), cataphora ("C" in the Table) and exophora ("E" in the Table). 0U denotes that the referent appears in front in the same utterance as the deictic expression. 1U denotes that the referent is in the utterance just before the deictic expression. Cataphora is the case where the referent appears in the rear of the deictic expression, while exophora means a deictic expression whose referent does not appear explicitly in the discourse [Nogaito (1987)].

Words such as "*kono*" (this), "*sono*" (that), "*ano*" (that) are believed to refer to matters within the memory model rather than pointing out some specific object in the conversation. They were therefore not included in the total count for this survey. "*Kochira*" (here) and "*sochira*" (there) were classified as exophora.

The relative frequency in the Table above is the number of deictic expressions within the distance divided by the total number of deictic expressions.

Table A-4 Number of Words in a Single Utterance

| Number of Words in Single Utterance | Telephone Conversation | | Keyboard Conversation | |
|---|---|---|---|---|
| | Utterances | Frequency (%) | Utterances | Frequency (%) |
| 1~10 | 422 | 52.4 | 77 | 34.7 |
| 11~20 | 157 | 19.5 | 84 | 37.8 |
| 21~30 | 89 | 11.1 | 39 | 17.6 |
| 31~40 | 69 | 8.6 | 13 | 5.9 |
| 41~50 | 34 | 4.2 | 7 | 3.2 |
| 51~60 | 10 | 1.2 | 1 | 0.5 |
| 61~70 | 9 | 1.1 | 0 | 0.0 |
| 71~80 | 10 | 1.2 | 0 | 0.0 |
| 81~90 | 3 | 0.4 | 0 | 0.0 |
| 91~100 | 1 | 0.1 | 1 | 0.5 |
| 101~110 | 0 | 0.0 | 0 | 0.0 |
| 111~120 | 0 | 0.0 | 0 | 0.0 |
| 121~130 | 1 | 0.1 | 0 | 0.0 |

The reason relative frequency (%) of 1- to-10-word utterances is extremely high in telephone conversations is believed to be due to the high frequency of one-word utterances. In keyboard conversation, it is limited to 4.5% (This is usually the word "*hai*" which confirms the conclusion of the utterance or indicates agreement).