

# Aizuchi as a sign of internal information processing and its interpretations by listeners

Yoshiko Kawabata\* and Toshihiko Matsuka†

\* National Institute for Japanese Language and Linguistics, Tokyo, Japan

E-mail: kawabata@ninjal.ac.jp Tel: +81-42-540-4551

† Chiba University, Chiba, Japan

E-mail: matsuka@chiba-u.jp Tel/Fax: +81-43-290-3578

**Abstract**—A back-channel is a short utterance made by non-primary speakers. In the Japanese language back-channel is called "Aizuchi." Aizuchi has long been considered as a positive reaction to the primary speaker showing agreement or appraisal and or giving the right to continue speaking. Togashi argues that, in contrast to the conventional view, the essence of aizuchi is a sign of internal information processing in the mind of the one who uses aizuchi. The present study examined the usage of aizuchi as a non-primary speaker's internal information processing using Japanese map task dialogue. The result of our analysis showed that aizuchi often occurred when the primary speakers introduced an object known by the non-primary speakers into the conversation as predicted by Togashi's view of aizuchi. It was also suggested that the presence/absence of aizuchi was not necessarily a clear sign indicating the non-primary speakers have knowledge about the target object but rough but useful information to predict the knowledge state of the non-primary speakers.

## I. INTRODUCTION

In conversation, a short utterance made by non-primary speakers is referred to as a "back-channel." [1] In the English language, "uh-hum," "mm-hm," and "yeah," are typical examples of back-channels, and in the Japanese language, "un," "hai," and "ee," are typically used as back-channels. In the Japanese language, these back-channels are referred to as "Aizuchi." Short expressions spoken by non-primary speakers are also called by various other names such as "continuer" [2] and "reactive token," [3] other than a back-channel. As their names suggest, non-primary speakers' short utterances have functions of showing understanding or reaction to the utterances of the primary speaker and indicating that the primary speaker still has the right to speak. In addition, Maynard [4] suggested aizuchi has the following functions:

- 1) Expressions to indicate the primary speaker has the right to continue speaking
- 2) Expressions to show understanding of the content
- 3) Expressions to support the primary speaker's judgment
- 4) Expressions to show the intention to agree with the opinions and ideas of the primary speaker
- 5) Expressions to emphasize emotions
- 6) Expressions to add, correct, or request information

(Maynard [4], p.160)

As you can see from this list, an aizuchi or a back-channel is basically considered to have some positive effect on the person exercising the right to speak (i.e., primary speaker), and it is about interactive activity between the primary speaker and the non-primary speaker (i.e., listener). In other words, the essence of the aizuchi is manifesting awareness and "compassion" from the non-primary speaker to the primary speaker.

In contrast to these conventional views of considering back-channels as "reaction to the primary speaker," or "interactive activity among participants of conversations," the present study focuses on the cognitive processing behind the non-primary speaker who uses aizuchi in the Japanese language. In particular, we pay close attention to two typically used aizuchis, namely "un" and "hai," uttered in the middle of conversations.

Togashi [5] [6] argued that manifestation of intention to listen or reaction to the primary speakers is a mere byproduct of the pragmatic effect of aizuchi and is not its main function. Since aizuchi is generally used in the same form as interjections, Togashi argued that the essential function of the aizuchi is to disclose the internal cognitive processing of non-primary speakers, just like any other interjections. He, then, attempted to explain the functions of the aizuchi in a unified manner with other interjections.

According to Togashi, when a non-primary speaker hears an utterance of the primary speaker, he or she tries to form links between given information spoken by the primary speaker to some potentially related information. When links are formed, aizuchi, "hai," and "un" are uttered to (intentionally or unintentionally) display the process. The indication of this internal information processing is, according to Togashi, considered the essential and main function of aizuchi, while reacting to the primary speaker is regarded as a mere pragmatic effect. Togashi also suggested that the main function (i.e., disclosure of internal processes) of aizuchi and its pragmatic effect overlap, but he did not describe how they overlap. Togashi indicated that the pragmatic effects of aizuchi's secondary function (a sign of intention to listen, understanding of the content of the utterance, and/or permission to continue speaking) was to allow the primary speaker to understand the current situation, but did not discuss what type of pragmatic effects of its primary function (i.e., disclosure of internal linking processes)

could be expected to participants of conversations.

In the present study, we use task-oriented dialogue to clarify the functions of aizuchi uttered during performing tasks, and then examine the relationship between the two functions of aizuchi classified by Togashi. We will refer to the disclosure of internal information processing linking the contents of utterance and relevant information, which Togashi has positioned as the essential function of aizuchi, as the "internal information link function." We refer to the conventional pragmatic effect showing intention to listen or reacting to the speaker as the "speech comprehension marking function."

The structure of this paper is as follows. In Section II, we focus on non-primary speakers who used aizuchi and analyze under what conditions aizuchi was frequently used. In Section III, we focus on primary speakers who heard aizuchi and analyze what functions aizuchi would have in conversations. In Section IV, we discuss the functions of aizuchi in conversations in general.

## II. ANALYSIS 1

In Analysis 1, we examine whether aizuchi is being uttered for the internal information link function or speech comprehension marking function, by analyzing in what condition aizuchi appears frequently and how they are used. Specifically, we pay attention to the response made by non-primary speakers (NPS) when primary speakers (PS) introduce an object into the conversation for the first time and when PS inserts a pause during the conversation.

If NPS knew a particular object mentioned in a conversation, then he or she would link the object to relevant information, making him or her exhibit aizuchi. Thus, if the internal information link function view is correct, then it is expected that NPS will be more likely to say "hai" or "un" when the objects in conversations are already known or recognized by NPS compared to the unknown.

Another factor that affects the usage of an aizuchi is a short pause in the conversation. The usage of an aizuchi is known to increase near short pauses during the conversation, which is generally interpreted as a manifestation of the intent to listen or give permission to continue speaking. Thus, if the speech comprehension marking function view is correct, then it is expected that NPS will be more likely to use an aizuchi when a pause is inserted in the middle of the conversation.

In Analysis I, we analyzed how often and what kind of aizuchi was made when objects in the conversations were known and unknown to non-primary speakers and when a pause was present or absent in the conversations.

### A. Data

We analyzed activities and conversations in Japanese Map Task Dialogue Corpus (JMTDC)[7], in which pairs of agents collaboratively performed tasks in separate locations without any visual feedback of others' actions. JMTDC was created with reference to HCRC Map Task Dialogue Corpus[8] using Japanese-speaking participants. There were two participants in each corpus data set. In each data set, one participant verbally

gave directions (we refer to this type of participant as a "giver" hereafter) to the other participant (i.e., follower) who was instructed to draw the given route.

Sixty-four students (32 males and 32 females) from Chiba University participated in JMTDC experiment. They participated in the experiment in a pair with an acquaintance. Each pair were also paired with another pair to form a group of four participants. Each participant completed the map tasks four times (twice as a giver and twice as a follower with different individuals). A total of 128 dialogues were recorded. Half of the 128 dialogues were recorded under a situation in which the participants were able to see each other's faces and the other half without eye contact. In the present study, we only analyzed the latter half as we did not want anything other than aizuchi (e.g., gesture or facial expression) to function to "show the intent to listen" or "disclose internal processes."

Although the maps given to the givers and followers were roughly the same, they were slightly different. Multiple landmarks were placed on the maps given to both givers and followers, and were designed to be referred to in the explanation and understanding of the route. Each landmark could be divided into four types according to its placement and presence on the maps given to givers and followers. The four types were: (A) "shared" type where the landmark was present at the same location on both givers' and followers' maps; (B) "absent" type where the landmark was present on only one map; (C) "two-to-one" type where there were two landmarks (of the same kind) on one map and only one on the other; (D) "unmatched name" type where the landmark was present at the same location on both maps but in different names. Among four types, we analyzed the data where "shared" and "absent" landmarks were introduced into the conversation in Analysis I.

When a "shared" landmark was introduced into the conversation, the non-primary speaker had correct knowledge about the landmark, and we refer to this type of condition as "knowledgeable" condition in the subsequent analyses. In contrast, when an "absent" landmark was introduced in the conversation, the non-primary speaker had no knowledge about the landmark. We refer to this type of condition as "unknowledgeable" condition.

### B. Annotation

Data were extracted and annotated according to the following procedure:

a) *Extraction of utterances:* From the 68 dialogues, we extracted the utterances in which the primary speaker first introduced the "shared" or "absent" landmarks into the conversations. The utterance in which the landmark was first introduced is when the utterance containing the landmark begins the earliest in the entire conversation. However, if the utterance was inaudible to the non-primary speaker or if the primary speaker uttered about the landmark but stopped halfway through, we used the subsequent audible and complete utterance in our analysis.

*b) Presence of pause:* From the utterances extracted in (a) above, we judged whether or not each utterance contained a pause. We consider there was a pause when there was no utterance for at least 0.3 seconds after the landmark was mentioned within the same clause. The length of the pause was generally defined 0.3 seconds or more, but if the primary speaker's speaking speed clearly declined and indicated that the pause was taken, we considered that there was a pause even if it was shorter than 0.3 seconds.

*c) Presence of aizuchi:* In the present study, an aizuchi was defined as a short utterance made by the non-primary speaker during the primary speaker's utterance. An aizuchi in the middle of an utterance was the aizuchi that took place after the primary speaker's utterance began and before it ended.

*d) Classification of non-primary speakers' response:* The classification of responses made by the non-primary speakers is shown in Table I. Other than aizuchi, the non-primary speakers made utterances confirming or disconfirming whether the landmarks mentioned by the primary speakers were present in their maps.

TABLE I  
TYPES OF RESPONSES MADE BY THE NON-PRIMARY SPEAKERS

Type	Description and examples
Aizuchi	Interjection. e.g. "un", "hai" etc.
Confirmation	Stating that the landmark is present on the map. e.g. "Aru", "Ari-masu" etc.
Disconfirmation	Stating that the landmark is not present on the map. e.g. "Nai", "Nai-desu" etc.
Others	Other than above

### C. Result

Table II shows the result of our analysis. As can be seen from the table, the non-primary speakers rarely made reactions when there was no pause in utterances. Similarly, the non-primary speakers rarely made reactions when the landmarks mentioned by the primary speakers were not present in their maps (i.e., unknowledgeable condition). An aizuchi was most frequently used in the knowledgeable condition with a pause. In contrast, no aizuchi was used in the unknowledgeable condition without a pause. When there was no pause in utterances, an aizuchi was used more frequently used in the knowledgeable condition than the unknowledgeable condition. When there was no pause in the knowledgeable condition, aizuchi was rarely used, but compared to other conditions, there were more utterances disconfirming the presence of landmark.

### D. Discussion

The fact that "hai" and "un" were somewhat frequently used in the knowledgeable condition and rarely used in the unknowledgeable condition indicates that non-primary speakers' aizuchis resulted from the internal information processing

TABLE II  
RESULT OF ANALYSIS 1

Pause	Type of response	Knowledge about landmarks	
		Known (%)	Unknown (%)
Present	None	19 (26.0)	22 (64.7)
	Aizuchi	32 (43.8)	1 (2.9)
	Confirmation	22 (30.1)	1 (2.9)
	Disconfirmation	0 (0)	6 (17.6)
	Others	0 (0)	4 (11.8)
	Subtotal	73 (100)	34 (100)
Absent	None	337 (92.3)	224 (100.0)
	Aizuchi	17 (4.7)	0 (0)
	Confirmation	10 (2.7)	0 (0)
	Disconfirmation	0 (0)	0 (0)
	Others	1 (0.3)	0 (0)
	Subtotal	365 (100)	224 (100)
Total		589	107

linking the contents of the primary speakers and their knowledge. This result is consistent with Togashi's claim suggesting that the aizuchi discloses internal information processing of the non-primary speakers (i.e., internal information link function). However, when compared with and without pauses under the knowledgeable condition, the usage of aizuchi was considerably lower without pauses. If the disclosure of internal information linking processes was the essence of the aizuchi, an aizuchi should occur spontaneously even if there was no pause in the utterance. The fact that the frequency of aizuchis was increased when non-primary speakers were knowledgeable about the landmarks mentioned in the utterance and when there was a pause in the utterance indicates that the aizuchi may have both the internal information link function and the speech comprehension marking function.

### III. ANALYSIS 2

The result of Analysis 1 showed that aizuchis were observed less frequently when there was no pause in the utterance made by the primary speaker, but they were frequently observed when the non-primary speakers had knowledge about the landmarks. The result support that internal information link function was one of the main factors exhibiting aizuchi. What role did the internal information link function play in the map task dialogue? In Analysis 2, we considered aizuchi to be the disclosure of internal information processing and examined what kind of function the aizuchi has in conversations. The increased usage of aizuchi when there was a pause in the utterance suggests that the primary speaker inserts a pause to induce aizuchi for some purposes. We analyzed in what kinds of conversation a pause was inserted into utterances to examine the functions of aizuchi.

It has been known that there are various forms of utterances that first introduce landmarks in the map task dialogue[9]. In the present study, utterances that introduced landmarks were classified into four types, namely "questioning existence," "assuming existence," "asserting existence," and others. An utterance classified as "questioning existence" is an utterance that requests a non-primary speaker about the presence or absence of a landmark and takes the form of a question or

request for confirmation. An utterance classified as "assuming existence" is an utterance that assumes that the same landmark exists on the non-primary speaker's map and takes the form of instructions. An utterance classified as "asserting existence" is an utterance that the primary speakers tells non-primary speakers about the location and characteristics of a landmark.

In Analysis 2, we classified the types of utterances that introduce landmarks into conversations and examined the effects of each utterance type and the presence or absence of aizuchi on interactions between primary speakers and non-primary speakers.

TABLE III  
TYPES OF LANDMARK INTRODUCTION UTTERANCES

Type	Description and examples
Questioning existence	An utterance that asks the non-primary speaker for information about the presence or absence of a landmark. e.g. "Is there a Stone desert?"
Assuming existence	An utterance that includes instructions assuming the non-primary speaker has knowledge about the landmark. e.g. "Please pass over the Ranch."
Asserting existence	An utterance that tells the non-primary speaker about the location and characteristic of a landmark. e.g. "There is a Golf course at top right corner."
Others	Other than above

#### A. Method

While Analysis 1, only the utterances in which the landmarks were classified as either "shared" and "absent" types were used for analysis, in Analysis 2, the utterances that included all four types of landmarks were analyzed. As in Analysis 1, we extracted the utterances in which the primary speaker first introduced the landmarks into the conversations. We then classified the types of utterances into either "questioning existence," "assuming existence," "asserting existence," and others. In addition, we judged whether or not there was a pause in each utterance. The definition of a pause follows that of Analysis 1.

#### B. Result

Table IV shows the result of our analysis. The frequency of the utterance type in which the landmark was first introduced into the conversation was "questioning existence," "assuming existence," and "asserting existence" in that order (excluding others). The proportions of pauses were highest where the utterances were classified as "assuming existence" followed by "questioning existence" and least proportionate in "asserting existence" utterances.

#### C. Discussion

Here, we examined the function of aizuchi by looking at some actual conversation segments of "questioning existence" and "assuming existence" utterances where higher proportions of pauses were observed.

TABLE IV  
RESULT OF ANALYSIS 2

Utterance Type	With pause	Without pause	Percentage(%)
Questioning existence	67	421	13.7
Assuming existence	41	69	37.3
Asserting existence	10	91	1.0
Others	9	95	8.7
Total	127	676	15.8

1) 14.57-18.20 G: eto soko kara [Yama-kaji no ato no {.95}
2) 16.35-16.48 F: [hai
3) 18.28-18.49 F: <b>un</b>
4) 19.15-22.61 G: ji no tokoro made migi-sita ni [mazu ori te kudasai
5) 21.28-21.90 F: [migi-sita ni
6) 22.97-23.13 F: hai
English translation (words added for interpretability)
1) G: um, from there, of the site of a Wildfire...
2) F: yes.
3) F: yes.
4) G: at first, go down bottom right, until the letters (that correspond to the Wildfire).
5) F: at the bottom right.
6) F: yes.

Fig. 1. An example of "Assuming existence" utterance with a pause accompanied by aizuchi

Fig.1 shows an example where the primary speaker inserted a pause in an "assuming existence" utterance and the non-primary speaker emitted aizuchi at the pause. In the 1st and fourth lines in Fig.1, the primary speaker (giver) requested the non-primary speaker (follower) to draw a route to the lower right corner of the map where there was a trace of "Wildfire." There was a 0.95 seconds pause between the 1st and fourth lines, during which the non-primary speaker said "un" or made an aizuchi.

Since non-primary speakers often make an aizuchi when he or she knows about an object or landmark mentioned in the primary speaker's utterance (Analysis 1), an aizuchi can be considered a sign indicating that the non-primary speaker knows about the target object. Since utterances that can be classified as "assuming existence" are generally used when primary speakers premise that non-primary speakers know about the target object, it is quite likely that primary speakers interpret that his or her assumption was correct by hearing an aizuchi during "assuming existence" utterances.

If an aizuchi is a sign indicating that the non-primary speaker knows about the target, then not hearing aizuchi during "assuming existence" utterances with a pause can be a sign indicating the non-primary speaker does not know about the target. But our data suggest it is not the case. One reason is that, as shown in Table I of Analysis 1, the non-primary speakers sometimes did not emit an aizuchi even when he or she knew about the landmarks mentioned by the primary speakers. Another reason is that there were utterances in which the non-primary speakers did not emit an aizuchi during

"assuming existence" utterances with pauses, but the primary speakers continued asking the non-primary speakers to draw routes as if the non-primary speakers knew about the target landmarks. That is, the absence of aizuchi did not necessarily function to signal that the non-primary speaker did not know about the target.

- 1) 510.43-517.02 G: takasa wa Takayama-syokubutsu-en no e no ue de {.57} yoko wa {.51} Yuusu-hosuteru to {.40} no hidari  
 2) 517.32-517.43 F: e Yuusu-hosuteru tsuu no ga nai  
 3) 518.91-519.48 G: nai n desu ka?  
 4) 519.52-519.72 F: a hai
- English translation (words added for interpretability)  
 1) G: The latitude is about the Alpine botanical garden and the longitude is left of the Youth hostel.  
 2) F: Huh. There is no Youth hostel.  
 3) G: Isn't it?  
 4) F: Oh, yes.

Fig. 2. An example of "Assuming existence" utterance with a pause not accompanied by aizuchi

In Fig. 2, the primary speaker inserted a 0.40-second pause immediately after mentioning about Youth hostel in the first line, but the non-primary speaker did not emit aizuchi.

After the primary speaker's utterance (line 1), the non-primary speaker told his or her counterpart that the hostel did not exist in the map in the second line. The primary speaker then surprisingly realized that there was no Youth hostel in the non-primary speaker's map (third line). In other words, the fact that there was no aizuchi from the non-primary speaker did not mean that the non-primary speaker did not know about the landmark (Youth hostel) in this conversation.

We speculated that aizuchi made during "assuming existence" may be a sign that the non-primary speaker knew about the target landmarks. If this is true, then it is quite likely that the primary speakers insert pauses to elicit this type of aizuchi without explicitly asking about the existence of landmarks. However, it seems doubtful whether the same thing (inserting a pause) can be said to other types of utterances. This is because, as shown in Table IV, even in "questioning existence" utterances asking whether the non-primary speaker knew about the landmarks, a pause was inserted in the middle of the utterances. Inserting a pause in the utterances that ask if the non-primary speakers knew about the landmarks to elicit a confirming or disconfirming aizuchi seems verbose and irrational. However, by examining the "questioning existence" utterances closely, we found the possibility that inserting a pause can elicit information to predict the knowledge of the non-primary speaker, which in turn contributes to efficient conversations.

Let first look at an example of a "questioning existence" utterance with a pause that resulted in verbose information exchange. As shown in Fig. 3. In a "questioning existence" utterance, the primary and non-primary speakers exchange confirmation about existence of the landmark. In Fig. 3, the primary speaker asked the non-primary speaker whether there

was a large Pine tree in his or her map (1st line), and after receiving a positive response from the non-primary speaker (2nd line), the primary speaker confirmed that the landmark was present again (3rd line).

- 1) 106.65-108.96 F: Seitetsu-jo no migi-te ni wa Ookina matsu no ki ga ari masu?  
 2) 108.80-109.55 G: a hai hai hai hai  
 3) 109.34-109.92 F: ari masu ne hai  
 4) 109.85-110.20 G: hai hai
- English translation (words added for interpretability)  
 1) F: Is there a Big pine tree on the right side of the Steelworks?  
 2) G: Oh, yes, yes, yes, yes.  
 3) F: There is. yes.  
 4) G: yes, yes.

Fig. 3. An example of "Questioning existence" utterance without pause

- 1) 14.41-15.93 G: ee migi-gawa ni {.81}  
 2) 16.17-16.33 F: hai  
 3) 16.75-18.82 G: Ginkou [{.58}] ari masu yo [ne  
 4) 17.48-17.96 F: [a **hai**  
 5) 18.57-18.80 F: [hai
- English translation (words added for interpretability)  
 1) G: Eh, on the right side...  
 2) F: yes.  
 3) G: there is a Silver mine, isn't it?  
 4) F: Oh, yes.  
 5) F: yes.

Fig. 4. An example of "Questioning existence" utterance with a pause

The sequence of a conversation in Fig. 3 takes a form of a question followed by a positive response, confirmation, then another positive response. This type of conversation sequence may be shortened into "question/confirmation followed by a single positive response" by having an aizuchi in the conversation. In Fig. 4, there was a 0.58-second pause after the primary speakers' utterance about Silver mine, during which there was an aizuchi (i.e., "hai") made by the non-primary speaker. In this conversation, the existence was questioned and confirmed only once by the primary speaker. In this manner, if there is an aizuchi in the middle of "questioning existence" utterances, the question/confirmation was often asked/made only once during the conversations. These careful examinations suggest that the presence/absence of aizuchi is not necessarily a clear sign indicating the non-primary speakers have knowledge about the target object but rough but useful information to predict the knowledge state of the non-primary speakers.

Because the map task dialogue data analyzed in the present study were dialogues in which the knowledge of the participants was limited (maps which they had never seen before), the causes and effects of the non-primary speakers' internal information link might have been limited. Therefore, the result that the primary speakers being able to predict the knowledge of the non-primary speakers from aizuchi might have been task-dependent. In this regard, we probably need to collect and analyze conversations in various situations.

Nevertheless, at the same time, the situations and factors may be too complicated in analyzing "everyday" conversation, and it may be difficult to clarify what caused the non-primary speakers to link information. If so, like our study limiting and controlling situations is a small but effective step toward a better understanding of the functions of aizuchi or utterances in general.

In previous studies, the function of aizuchi was considered the interactive activities between primary speakers and non-primary speakers. By considering aizuchi as the disclosure of internal information processing, we can extend and expand our understanding of aizuchi. In so doing, we may be able to understand in what circumstances aizuchi occurs and the true functions of aizuchi in the interactive activity among conversation participants.

#### IV. CONCLUSIONS

The present study considered that the essential function of aizuchi is the disclosure of internal information processing of non-primary speakers, proposed by Togashi, and used map task dialogues to examine its validity. The result of our analysis (Analysis 1) showed that aizuchi often occurred when the primary speakers introduced an object or landmark known by the non-primary speakers into the conversation. The result was consistent with Togashi's theory of internal information link regarding aizuchi. However, there was a considerable difference in the frequency of appearance of aizuchi between the presence and absence of pauses within the primary speakers' utterances. It was considered that the appearance of aizuchi also functioned as responses to the primary speakers, as suggested by a conventional view of aizuchi. That is, our analysis showed that aizuchi has both the internal information link function (i.e., disclosing internal information processing linking the contents of utterance and their knowledge) and the

speech comprehension marking function showing intention to listen or reacting to the primary speakers.

In Analysis 2, we examined the function of aizuchi in conversation as an internal information link sign. Our results showed that the presence or absence of aizuchi did not serve as a clear sign that showed whether the non-primary speakers' did or did not have knowledge mentioned by the primary speakers, but it could be used as rough but useful information to predict the knowledge state of the non-primary speakers.

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