

# THE EFFECTS OF UNCONSCIOUS INTERMEDIATE ON BEHAVIOR AND MIND IN COMMUNICATION IN THE CASE OF "TEA"

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## ABSTRACT:

Environmental factors strongly affect communication. This may alter Kansei, which is a subconscious mental function, and subsequently affects how we communicate. In this study, we focused on "tea" and on the idea of a "tea-friend". The purpose of this study is to clarify how the presence of tea affects our Kansei, and the subsequent behavior during communication.

**METHOD:** Subjects in pairs who usually had teatime together were chosen. The subjects sat face-to-face and talked freely for 20 minutes in two different situations: with tea / without tea. Each pair of subjects took part in a communication session and then a second session 1-3 days later, with the presence of tea in one of the sessions, chosen randomly. A questionnaire was filled out to get the participants' subjective evaluation. **RESULT:** The average physical distance between

the subjects was shorter in the situation with tea than in the one without tea. Therefore, we suggest that tea enhances intimate communication. From participants' subjective perspective, tea-drinking is viewed as a means of gaze turning away from the facing. Considering a cup of tea as a promoter of one's natural gaze turning, it is reasonable to see tea as helping to put one at ease and develop intimate communication.

**Key words: non-verbal communication, behavior, collaborative system**

## 1. INTRODUCTION

When we communicate, environmental factors such as the situation, the atmosphere, the setting of objects, and the arrangement of the time, strongly affects the communication. On the other hand, Kansei, which is a subconscious mental function and subsequently affect how we communicate.

Communication involves guessing the intention of other participants and interpreting their nonverbal behavior such as the facial expression and gesture. Birdwhistell reported that 65% of an actual communication is conducted through nonverbal behavior[1]. Besides, many studies about relation between people have been performed. For example, Hall reported that the distance between two persons is highly related to their intimacy[2]. Oobo also reported that the shorter distance makes people friendlier to one another[3]. It is also reported that the phenomenon called "chameleon effect" or "entrainment", i.e. the tendency to adopt the postures, gestures, and mannerisms of interaction partners, brings a favorable impression[4, 5]. To figure out the process of forming entrainment, Itai made up a "Kendo" robot and match system and observed entrainment from the change of distance between two robots[6].

One study focused on the idea of a "tea-friend". In the study, Yamanaka and Tamura investigated the history of tea and tea-time, and observed behaviors in tea-drinking situations, working on the hypothesis that the presence of tea affects communication[7]. Based on this study, we planned to collect the observation data, improve the method Yamanaka and Tamura used, and clarify how the presence of tea as well as a tea-friend affects Kansei and the subsequent behavior during communication.

We also have a view to applying the finding to computer-mediated communication. According to Watanabe's research, in virtual communication, conversation was enhanced and entrainment tended to be occurred when both of virtual actors appeared on the monitor[8].

Many studies of collaboration systems on a network have been carried out. However, most of these studies approached the issue in terms of "Reduced Social Cues"[9] or "Cue-Filtered-Out"[10] We propose the concept of "adding" cues to convey more useful information and knowledge, we focused on tea, which we consider an unconscious intermediate in human communication.

As stated above, we improved on the method of data acquisition. Yamanaka and Tamura concluded that the subjects' action became milder and the subjects tended to position themselves more closely when they were talking over a cup of tea. But there was a lack of measurement accuracy and time resolution. In the first study we established a way to measure positions automatically, and more precisely. We requested each pair of subjects to undergo two experimental sessions: situations with tea and without tea. The result indicated that the mean distance between subjects tended to be shorter in the situation with tea than in the one without tea. It also indicated that mean velocity of the subjects' head movement did not show significant difference. Another interesting finding was that the passage of time influences behavior more than the presence of tea[11].

With these points, we altered the way of experiment in this term and considered.

## 2. METHOD

### 2.1 EXPERIMENTAL SETUP

We used an observational method to examine the relationship between two subjects in a tea-drinking versus a non-tea drinking situation.

Experimental headset: The top was marked with a yellow dot to track subjects' head movement for analysis. A single room was prepared for the experiment. One table (800mm\*1600mm) and two chairs were set in the room. The outside view was kept out of sight with drawn curtains, so as

to minimize external stimuli. The room temperature was adjusted to a comfortable level before each experimental session. A Sony digital video camera was clamped onto a rod at the ceiling to record the subjects' talk behavior.

In addition, an experimental headset, top of which was marked with a yellow dot was provided for each subject. It enabled us to analyze numerically the head movement of the subjects by tracking the yellow dot.



Fig. 1. Experimental headset: The top was marked with a yellow to track for analysis.

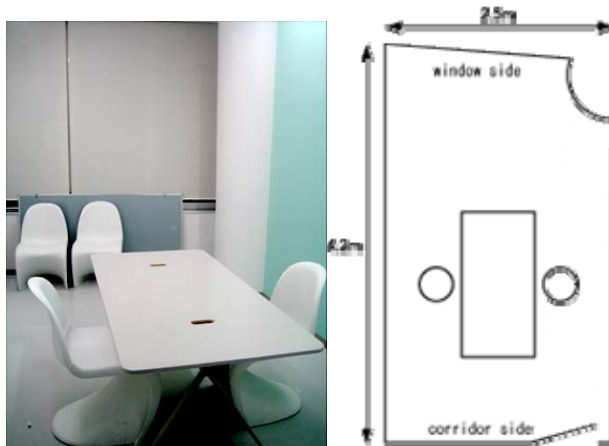


Fig. 2. Experimental room

## 2.2 ANALYSIS

The recordings movies were converted from 30fps color DV video format into 5fps grayscale AVI video format for analysis. The movement of the dots, which were taken to represent the parietal areas of the subjects, was quantified with DIPP-Motion(DITECT). This is a motion tracking software for image analysis. We evaluated the physical relationships on the basis of two measurements: distance between the pairs subjects and the velocity of head movement of each

subject during each experimental session. JMP(SAS Institute Japan) software was used for statistical processing.

### 3. EXPERIMENT

#### 3.1 SUBJECTS

The subjects of this experiment were 10 pairs of Japanese students at Tsukuba University(5 male pairs(MM) and 5 female pairs(FF)). They were between 19-30 years of age and had no neurological dysfunction or disease. The pairs were assigned by requesting one subject (chosen randomly) of the pair to bring along a friend of the same sex with whom he/she frequently talked together. This second person acted as the “tea-friend”. Each pair was requested to take part in two experimental sessions, with each session taking place at the same time of the day, on two different days. Each pair was also requested to refrain from eating or drinking two hours prior to the experimental session to normalize their physiological condition.

#### 3.2 QUESTIONNAIRE

At the end of each experimental session, the participants filled out a questionnaire. This questionnaire consisted of 42 items, provided in Table 1. The subjects were asked to give information on what the conversation was like, and how they and their partner behaved. This was done in accordance with a previous study that investigated the influence of communication tools in virtual space[12-13]. The subjects were asked to give their responses by making choices on a likert scale from -2(I strongly disagree) to +2(I strongly agree).

Table I. Questionnaire

No.	Questionnaire: In this session,
1	I enjoyed the conversation.
2	topics were new and interesting.
3	I remember what we talked about.
4	it was easy to make the starter of conversation.
5	I could imagine the flow of conversation.
6	I had a stimulating conversation.
7	I talked about one topic for a long time.
8	I felt silent.
9	I felt the time was short.
10	topic was safe and neutral.
11	I backed up my friend's story.
12	I said what was on my mind immediately.
13	I had difficulty to find something to talk about.
14	I got interested in my friend's talk.
15	I felt sympathy for my friend.
16	I made myself agreeable to my friend.
17	I heard what my friend said well and summed up.
18	I looked at my friend's face.
19	it was easy for me to start talking.
20	I spoke much more than my friend.
21	I felt tense.
22	I am excited.
23	I talked calmly.
24	I am refreshed.
25	I am tired.
26	I concentrated on the conversation.
27	I talked putting ideas in order.
28	my friend talked putting ideas in order.
29	I brought up topics well.
30	my friend brought up topics well.
31	I cared about friend.
32	my friend cared about me.
33	I expressed feeling.
34	my friend expressed feeling.
35	I expressed opinion.
36	my friend expressed opinion.
37	I talked much.
38	my friend talked much.
39	I listened to my friend.
40	my friend listened to me.
41	I tried to tease out my friend's ideas.
42	my friend tried to tease out my ideas.

### 3.3 EXPERIMENTAL PROTOCOLS

The subjects followed the experimental procedure twice, once in a situation with tea and once in a situation without tea. The subjects were asked to leave their bags in the waiting room and turn off their cell-phones before going into the experimental room. They were sat down face-to-face across the table. They were told 1)we would do an experiment on communication behavior. 2)we would record their behavior but not use what they talked about for analysis. 3)they would have to wear the experimental headset if they agreed to take part. Cups of tea were served in the situation with tea. Then they were allowed to talk freely for 20 minutes. After starting the recording, the observers left the room. After that, the questionnaire was administered. The procedure is shown as below.

Table2. Workflow

Time(min.)	Task
0	Prepare facilities and room temperature
30	Let subjects into the room Provide headsets Explanation about the experiment Start to record
35	Talking time (20min.)
55	Questionnaire
60	End of Task

### 3.4 ANALYSIS

The first 2 minutes of each recording was skipped assuming this was time for getting used to the environment. The next 10 minutes were used for analysis. We collected 3000 frames of recording examined the position coordinate. The subjects' cross direction was defined as the X-axis, and the horizontal direction was defined as the Y-axis. The data about the movement were analyzed with paired t-test and the data from the questionnaire were with unpaired t-test as quantitative evaluation and chi-squared test as qualitative evaluation.

### 3.5 RESULTS

Fig. 3 summarizes the change in the mean distance between the subjects. In the situation with tea, 8 of the 10 pairs showed a decrease and the other 2 pairs showed a little increase in mean

distance. On average the mean distance significantly decreased by 7.6%(from  $480.9 \pm 30.9$  pixels to  $444.9 \pm 32.9$  pixels,  $p < 0.05$ ).

Fig. 4 summarizes the change in the mean velocity of the subjects' movement. It was 14.3 pixels/sec in the situation without tea and 13.4 pixels/sec in the situation with tea. There was a tendency for the mean velocity to decrease in the situation with tea but this was not significant.

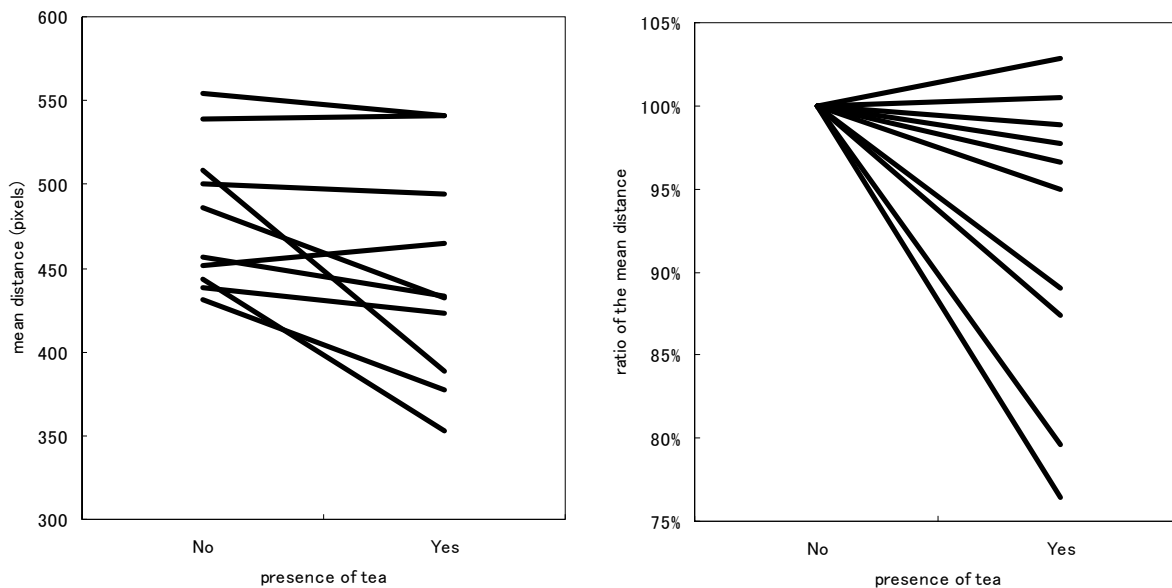


Fig.3 Change in the mean distance between subjects

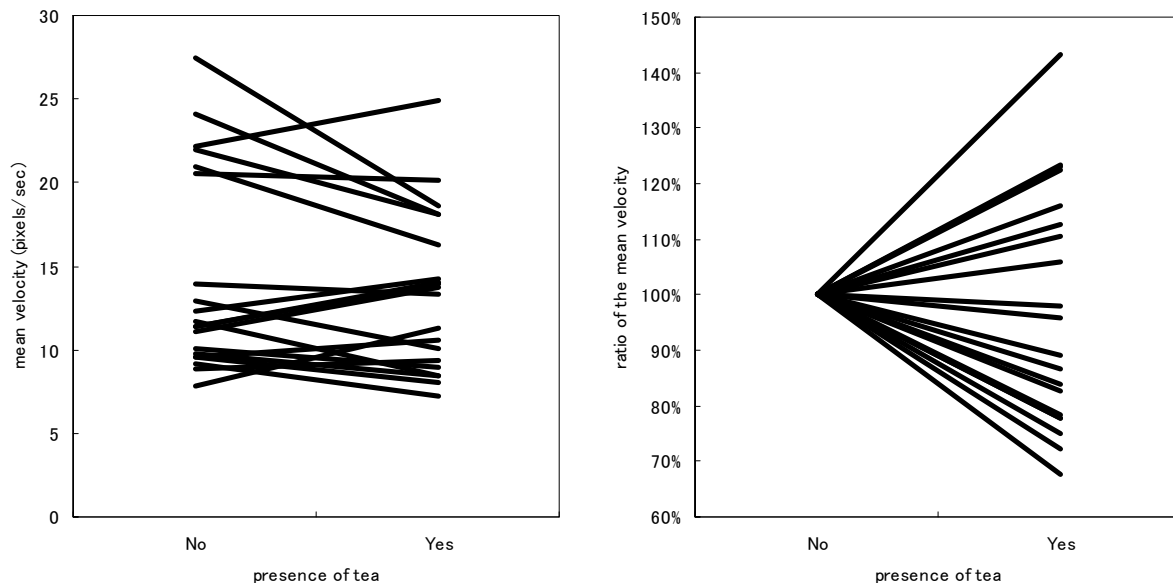


Fig.4 Change in the mean velocity of subjects' head movement



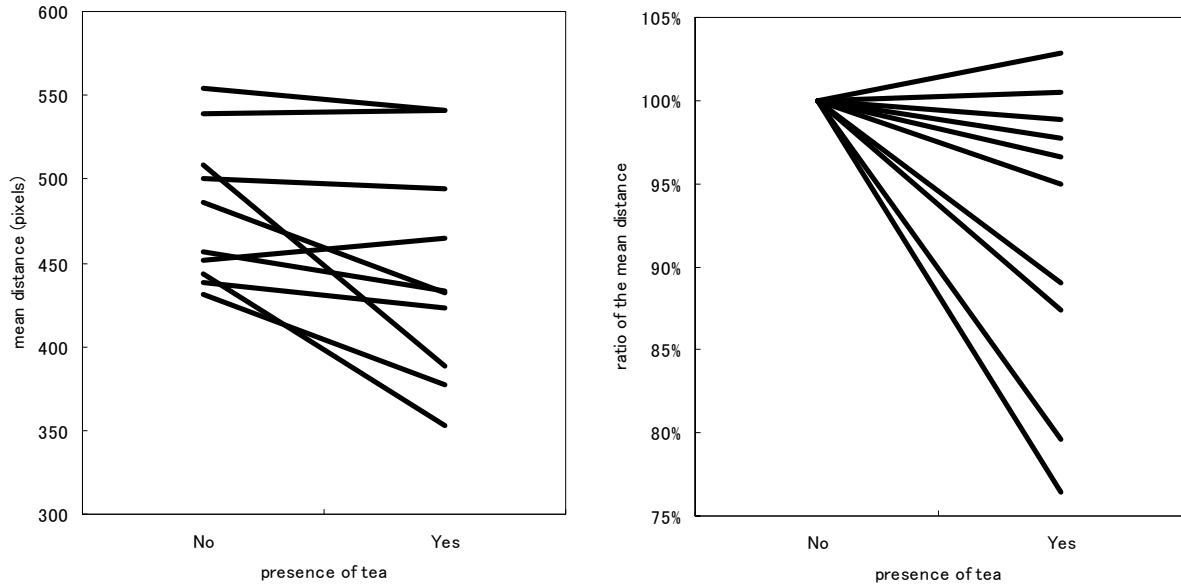


Fig.5 Change in the SD of the X-axis position coordinates

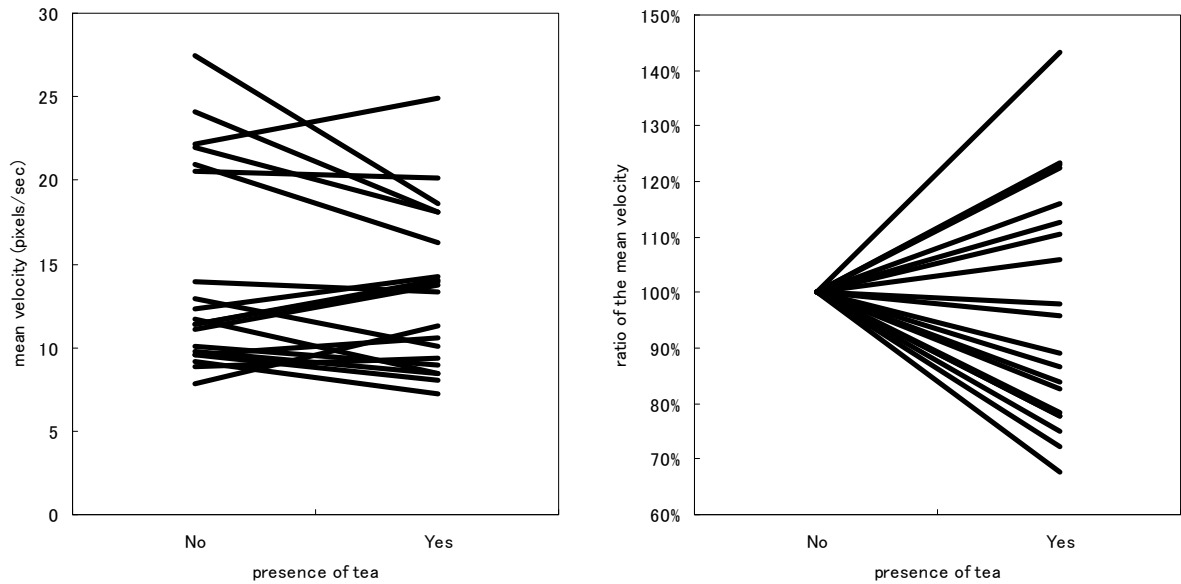


Fig.6 Change in the SD of the Y-axis position coordinates

In addition, the changes in the SD of the X and Y -axis position coordinates were calculated(Fig. 5 and 6). However there was no significant difference: 6.1% of X increased(from 19.3 pixels to 20.5 pixels), and <1% of Y decreased(from 13.3 pixels to 13.3 pixels) in the situation with tea.

Table. 3 Two items showed a difference of  $p < 0.1$  relativity in t-test.

No.	In this session,	mean value		p
		nT	T	
9	I felt the time was short.	0.90	1.40	0.067#
18	I looked at my friend's face.	1.45	1.10	0.084#

#  $p < 0.1$

Table. 4 Two items showed a difference of  $p < 0.1$  relativity in chi-squared test(One showed  $p < 0.05$ ).

No.	In this session,	mean value		p
		nT	T	
7	I talked about one topic for a long time.	0.40	0.40	0.081#
13	I had difficulty to find something to talk about.	-1.35	-1.30	0.036*
19	it was easy for me to start talking.	1.05	1.25	0.093#
34	my friend expressed feeling.	0.85	0.50	0.093#
42	my friend tried to tease out my ideas.	0.50	0.55	0.072#

#  $p < 0.1$ , \*  $p < 0.05$

Table 3 lists the items that showed a difference of  $p < 0.1$  relativity in t-test. There was no significant difference, however, the tendencies concerning talking time and the frequency of watching the partner's face: those two items were lower in the situation with tea than the one without tea.

Table 4 lists the items that showed a difference of  $p < 0.1$  relativity in chi-squared test. These 5 items show different distribution between the situations. In other words, the subjects tended to change their feeling about them. Especially, the item "I had difficulty to find something to talk about" significantly gave different distribution.

## 4. DISCUSSION

Before starting the discussion, the present study will be recalled and summarized briefly.

First, the method of data acquisition proposed by Tamura and Yamanaka was improved. Although they divided images vertically into 16 areas and measured positions of subjects' head manually every 5 seconds in the video, we established a way to measure these positions automatically, and more precisely. Moreover, we altered the way to process the experiment. Previously, we had performed each session at one time. The first communication session was separated from the second session by an interval of 1-3 days to eliminate the effect of the altering situation and of the time passage. Indeed, the previous studies indicated that the passage of time influences behavior rather than presence of tea.

We observed the distance between the subjects decreased in the situation with tea similar to the previous studies. The result of this experiment suggests that the presence of tea makes physical distance between the subjects shorter and develops intimate communication. On the other hand, it was figured out that with tea, the mean distance between subjects decreased from  $124.8 \pm 8.0$  cm to  $115.7 \pm 8.6$  cm long in actual length. What does the difference of 9 cm mean? Does it have any pertinent meaning? It can be said that moving the body of 4 or 5 cm is quite easy and always happens. However, if it is recognized that a closer pair have more intimate conversation, then this phenomenon is considerable on the point of view of non-verbal communication.

Also, the velocity of subjects' movement in the situation with tea did not show significant difference. This suggests that the presence of tea does not have any relation with the rapidness of human's movement. In the previous studies, it was found that the mean velocity of subjects had tended to decrease in later session. However, no significant results could be pointed out regarding the presence or not of tea.

Therefore, it is strongly suggested that presence of tea does not have any relation with the rapidness of human's movement, and we improved the protocol of this study in order to diminish the influence situation on the other one. However, the problem appeared after the protocol modification. the SD of both X and Y -axis position coordinates showed significant difference between first and second sessions (X:  $p < 0.01$ , Y:  $p < 0.05$ ). Since the SD of the position coordinates did not show significant different by presence of tea in any studies, there is nothing can be concluded concerning the presence of tea. In order to segregate the influence of tea and the influence of situation chronology, the improvement of protocol was necessary.

The participants' subjective evaluation indicated that the talk time tended to be perceived as shorter in the situation with tea. About time perception, Matsuda stated that four factors contribute: "absolute time", "neurophysiological stimuli", "attention to time passage", "information except time"[14]. In this case, "information except time" has the greatest effect because the analysis with t-test showed that tea itself increased the amount of information and diverted participants' attention to time flow. In fact, all the sessions lasted the same length of time and it was unlikely that the cold tea brought any neurophysiological effect[15]. Hence, it is reasonable to argue that a cup of tea induces natural gaze turning and relaxes one's mind. Although there was no significant difference in the item "felt tense", it was possible to observe unconscious relaxing from the physiological response. From the analysis with chi-squared test, 3 items concerning topics and 2 items concerning partner's attitude gave different distribution. Although to suggest at

a novel argument is difficult, it is possible to find out the correlation between the other items, and the behavior.

We focused on proxemics in our study. It would worth focusing on gaze in further investigation to find further evidence on whether a cup of tea is a promoter of one's natural gaze turning. For solving the matter of the reproducibility of an experiment, it might be required to use robots as Miwa[6] and researchers of informatics and robotics, did. Furthermore, we intend to explore further in order to figure out how unconscious intermediates could work for the next generation of communication device.

## 5. ACKNOWLEDGMENT

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