

# Abotar: An Expressive Method of Web Communication using Appearances of Avatars Attached to Text Messages and Remarks

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**Abstract:** Recent internet societies and social networking services provide very attractive systems for many internet users to communicate with more than one person. However, if the number of communication partners increase, we cannot read all remarks, comments, and replies. Also, the time duration to read each gets shorter. Sometimes we cannot have continuous relationship with these over-net friends. This paper proposes an expressive communication system using avatars' appearances in association with communicative remarks as seen in Twitter. The characteristic appearances enable to communicate by the texts with feeling other users' personalities. Each avatar's remark is appeared based on real remarks of the other users. Our Web-based expressive system shows multiple avatars in one virtual space. We aim that the multiple avatars express each remark's characteristic to distinctly emphasis partner's personality.

## 1 Introduction

People cannot always or often have face-to-face communications in daily lives. Individuals have many schedules to do in their own contexts. At first we must know schedule of our communication partner. If the partner does not have enough time, we cannot expect replies from her or him. The other problem is the motivation for the communication. If the partner is not interested in the communication at that time, the face-to-face conversation is not continuous or comfortable. Thus, the timing of the communication is very important. As one of the solution, there are communication systems on the web. These systems are not unnecessary to keep the partner in the same space at the same time. If one user posts comment, the others can post replying comments any times. There are many kinds of social networking services and communication systems on the web; for example, mixi<sup>1</sup>[1], Facebook<sup>2</sup>[2], twitter<sup>3</sup>[3] and so on. Twitter's remarks are flexible from the viewpoint of user information. The other SNSs need to register our personal information. The user of SNSs should carefully talk about the delicate contents. We focused on flexibility and casual communication as seen in Twitter communications.

We especially focused on communications on Twitter. Differently from the remarks in SNS timelines, the remarks in Twitter are not tagged to the personal information. In fact, many Twitter users update casual remarks, and we can sometimes observe users who have problems from their too much casual or excessive remarks. On the other hand, the remarks in Twitter are expected to include the user's real motive

and real feeling.

In Twitter, "Follow" is a function to connect with other users. The "Follow" means not only the mutual connection but also a one-way connection. Twitter users post their remarks, called "Tweet", to the system. In Twitter community, the users are updating their remarks to demonstrate their presences for the other users. From that point of view, Twitter is an important communication system on the web among the users who have such motivations. There are two types of partners in Twitter; one is a relationship only on the web, and the other is the relationship both in real world and such internet community. The remarks of the partners in both types are displayed in the same timeline for the user. Users can communicate each other by replying to or diffusing the remarks with no distinction. Users judge by icons and contents of remarks whose remark it is. Therefore, when users skim the timeline, they can understand who post the remarks, how many remarks are appeared, and the contents of the remarks with their communication contexts.

On the other hand, there is an automatic Tweet-posting system called "twitter-bot" instead of the user's own post. Some of the twitter-bot systems have reactivity; they automatically reply to someone's remarks, or change their remarks by time. The twitter-bot system represents a real user in Twitter or a virtual character. These characters can show their presences in network system such as Twitter. In addition, remarks are one of the tools to express personality.

In this research, we focused on the feeling of the personality and the presence of a particular partner. We define "feelings for personality" as the feelings and identification of each particular person. From the feeling for personality, we image characteristics for each person. In Twitter media including twitter-bot, users

<sup>1</sup><http://mixi.jp/home.pl>

<sup>2</sup><https://www.facebook.com/>

<sup>3</sup><https://twitter.com/>

can feel and identify personality from the appearances of icons with remarks. However, we do not have enough time to see all remarks related to ourselves because of many users' communication. It is difficult to feel each user's presence only from one remark when we cannot deeply read the timeline. In this paper, we propose an adaptation method of avatars' appearances to text-based communications. Remarks with visible avatars are expected to be easy to understand who posts them for the other audiences. In addition, the appearances connected to the remarks are intuitive to understand the person's personality. This system purposes to enrich such a communication by feeling partner's personality.

We aim to develop an anthropomorphic communication system with a feeling of partners' presences. We adopt a twitter-bot system to enrich the presence of the speaker of the remarks by the appearance of the real user's avatar.

We implemented system, " Abotar ", which demonstrate a virtual communication with feeling a real partner's presence. Based on text communications on the web as same as Twitter, the system automatically adds the avatars to each remark. There are multiple avatars in this system to express the presences and differences of multiple users. It is expected to feel partner's personality more intuitively. If the user can feel partner's presence by using this system, the real time system with avatars' appearances can be gave same effect.

## 2 Related Works

There have been many researches of total appearance of the virtual communication using avatars and agents. Yuasa et al. have proposed turn-taking simulations using avatars based on the attitude of the avatars [4]. The result of their research shows the possibility of the user's realistic participating feeling to the conversation when the avatars behave as appropriate behaviors.

Ito et al. proposed a communication system with multiple agents [5]. In this system, there are two types of agents, avatar and navigator, to apply to discussion support. An avatar remarks instead of the user, and the navigator counsels the user how she/he can join the discussion. The system can provide asynchronous participation in the discussion, however, the paper have not referred to the existences of asynchronous users.

Ueno et al. introduced a chatter-bot system to support smooth communication [6]. In the system, the agent is the third person. The system provides new topic of the conversation from Web. The users can have a satisfied conversation with acquired new knowledge especially when the other user has deep knowledge.

" TelMeA " is an asynchronous text communication system on the web using avatars and their motions [7, 8]. This research was motivated by similar purpose of our system, however, their avatars do not represent

a presence when the user have not accessed on the site. Contrary to them, we aim to implement our system to appear all users with their remarks as though all the users in a community are communicating on the site at the same time.

## 3 "Aboter" System

### 3.1 System Overview

To intuitively understand the communications and conversations in a timeline through overall flow and contents of remarks and messages in Web communications, we suggest using appearances of multiple avatars for expressing each message so that the user can feel as though each real user in connection with each avatar spoke numerous messages.

The user inputs the name of a particular avatar and clicks the " call " button. The called avatar is displayed in a Web window with a background scene. The appearances of the avatars are representing each real person and they make remarks and messages as though each real person makes the remarks and messages. Remarks of the called avatar are chosen and displayed in text data as the avatar's remarks as shown in Figure 1.

Figure 1 shows an image of the initial screen in a Web browser. The system can display the same view using any browser softwares because of the online system structure based on PHP and JavaScript. The screen of the Avatar system has several regions to display a) renewal times and greetings on top part of the display, b) a text form to input a particular avatar's name under the greetings, c) the list of all participants' avatars on the bottom of the screen, d) log texts of avatar's remarks in the right side of the screen, and the main region which displays the avatars with remarks in a speech balloon as shown in Figure 1.

The system is consisted of PHP, html and JavaScript a) to manage the remarks and b) to display the multiple avatars and their remarks in a virtual scene by various types of browser clients.

This system configuration is tentatively designed to verify the effectiveness of the avatars. So it is also easily build an automatic representation of the scene with multiple avatars, their remarks in each speech balloon, and a background by using a same scheme. The current system is basically designed to evaluate the effectiveness of the avatars, so we use a pull-based information distribution instead of automatic push information.

### 3.2 The System Operations

#### 3.2.1 The basic operations

The system consists of six types of the basic operation pattern as follows. 1. When the user inputs an avatar's name and click " call " button, the remarks of the real person in connection with the avatar are chosen from prepared text data (Figure 2). Then the

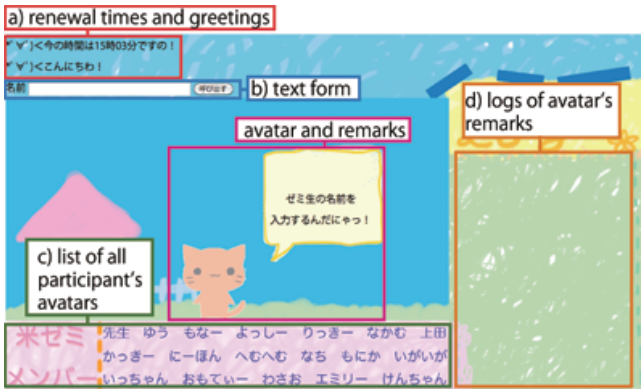


Figure 1: Initial screen image

avatar and its remarks are displayed in each assigned region. 2. When user calls the displayed avatar again, it moves to the center area from the original location (Figure 3). 3. Maximum number of the avatars to be able to appear in the scene is limited in four. These avatars are displayed by the order of recent call by the user (Figure 4). 4. When the user inputs “bye bye [avatar’s name]” in the text field, the avatar left from the scene (Figure 5). 5. When the user inputs “bye bye,” all of the displayed avatars are disappeared (Figure 6). 6. The scene expressions by the background pictures are changed by time of day (Figure 7).



Figure 2: Screen when



Figure 3: An avatar recalled to remarking space



Figure 4: Four avatars lined up by side



Figure 5: A avatar leave on the screen

In the operation 1 and 3, the visual presence and interactions, as like calling or making a line, are achieved by adding avatars' appearances to text communication. Each avatar has a particular appearance and behavior to show the only one existence in this system in the operation 2. In the operation 4 and 5, user can interact with specified avatars choosing avatars by inputting their names. The system reflects the scene of the real time with showing each appropriate background (the operation 6).

### 3.2.2 Acquisition of new remarks

There are two functions related to acquisition of new remarks. This system gets Tweet information from the Twitter website and adds new Tweets to text data of Abotar system as new remarks. If the user input “ [avatar’s name] Hello ”, this system adds the remark “ Hello ” as new remark to the avatar’s text data. Real presences of the people are always changing by time. At the same time, their remarks are changing day by day. Avatars are representing the remarks to reflect these changes. By updating the remarks, the avatars can express the characters of real persons.

### 3.2.3 Avatars' reactions

There are two types of the avatars' reactions to the mouse input. One is a reaction animation for the



Figure 6: All avatars leaves from the screen



Figure 7: Back ground pictures

mouse over and the other is a reaction animation for the click of the mouse (Figure 8). When the user moves the mouse over an avatar, the avatar waves its hand. When the user clicks on an avatar, the avatar makes “hurt” or “angry” expressions by each picture.

Through the mouse interactions, the user can feel as if the avatar and the user is communicating in real time.

## 4 System Evaluation

### 4.1 Avatars' Appearance to Text Remarks

**Hypotheses:** The communication system which was given an avatar can communicate to feel partner's existence and their personality more better than text-based communication.

**Subjects:** Fifteen people aged from twenty to twenty-two (seven males and eight females) participated in the experiment. They were university students in faculty of informatics.

**Procedures and Conditions :**



Figure 8: Avatars reaction to the mouse inputs

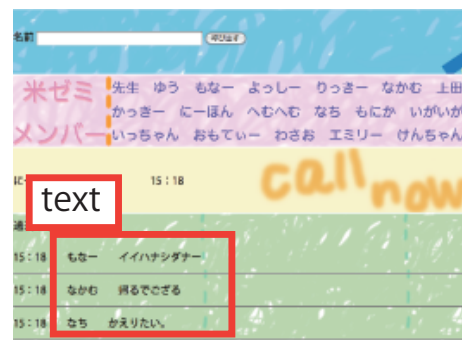


Figure 9: Screen view of condition of “ A”



Figure 10: Screen view of condition of “ B”



Figure 11: Screen view of condition of “ C”

participants used three kinds of systems each by one minute. Three kinds of systems are as follows. A: The system displayed only text. B: The system displayed text with icons. C: The system displayed text with our proposing avatars. The condition of A, B and C are shown in Figure 9, 10,11.

The operation method of each system is the same. participants input one of the names showing to a pink bar into an input form. After having input, the system works when participants click " call button ". Only condition of C, avatar can react by click and mouse over. This instructed it to experiment participants before system use and had participants try it at the time of use. In condition of B, icons appearance is same as avatars. The use order of three systems varies among experiment participants. Participants evaluated it after three system use.

**Evaluation Items:** The evaluation items are as follows. Participants performed five phases of impression rating for each item against three kinds of systems. The participants made an evaluation using a five-point rating scale of the relevance (5: very relevant, 4: somewhat relevant, 3: even, 2: somewhat irrelevant, 1: irrelevant) of the following statements:

1. You can have a good feeling toward a remark.
2. It was easy to understand the remark .
3. The personality of partner was felt by a remark .
4. When you use the system, as if you were talking with avatars.
5. It was easy to understand whom you called.
6. It was easy to understand whom you called in the past.
7. You can use a system with feeling existence of the partner whom you called.
8. You can feel personality from the icons or avatars whom you called.
9. You can have a good feeling toward the reaction of the avatars.

Participants replied in the condition B and C to the statement 8. The statement 9 was only for the condition C was.

**Results:** Figure 12 shows the result of means opinion score (MOS).

In evaluation items from one to eight, we carried out a repetition measurement analysis of variance in a level of significance as  $p < .05$ . The significant differences were found from the statements 1 to 7. Accordingly, we perform post-hoc tests for multiple comparisons and show the result in table 1.

Significant difference was seen in the statement 1 to 6 between A-B and A-C. However, it was not able to verify the significant difference between B-C. In the all conditions, the result of the statement 7 shows significant differences. From the result of insignificance in the statement 8, it was not able to get significant

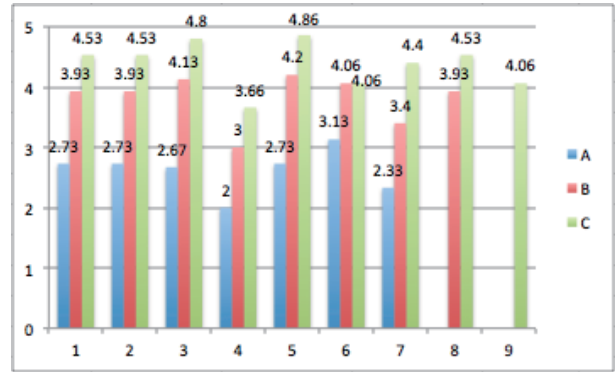


Figure 12: Results of subjective evaluation

Table 1: analysis of post-hoc tests

	A - B	B - C	A - C
1	s .	n . s .	s .
2	s .	n . s .	s .
3	s .	n . s .	s .
4	s .	n . s .	s .
5	s .	n . s .	s .
6	s .	n . s .	s .
7	s .	s .	s .

difference.

**Consideration:** There was no significance from the results, we assume that an avatar and icons in most evaluation items.

- a personality of person was felt in the same way as an avatar from an icon, and that
- the motion and the reaction of the avatar did not have individual difference.

The results show that the avatars' appearances in connection with text-based communication enrich the feeling of partner's presence.

Significant difference was not found between the icon condition (B) and the avatar conditions (C). Because the icons were From the similar appearances of the icons to the avatars' appearances based on common illustrations, it is supposed that there was sufficient element to make a user feel a personality of person. As a result of the statement 7, avatar's appearances attached to text-based communication can give the user feeling of partner's existence.

## 4.2 Reactivity and Characteristic Personality

**Hypotheses:** 1) Users can distinguish an individual by expressing the personality of the avatar only by physical movement. 2) When multiple avatars with different personalities are displayed, the communicative place with them are recognized.

**Subjects:** Fifteen people aged from nineteen to twenty-three (nine males and six females) participated in the

experiment. They were university students in faculty of informatics.

**Procedures and conditions:** In order to independently evaluate the behaviors of the avatar from the exterior appearance, we prepared an avatar as shown in Figure 14 for this experiment. To identify each avatar without exterior characteristics, alphabet symbols are written to the bodies of the avatars. The participants performed an exercise experiment before the beginning of the experiment to understand the operation method of the system. From this preceding experience, the participants could understand how to call avatars and avatar’s reaction to the mouse clicks and mouse over. This experiment system has four “ call ” buttons written in each alphabet of each avatar (Figure 13). The participants can call each avatar by clicking each button. Figure 14 shows avatar’s reactions in this experiment. We instructed the participants that the avatars are in connection with the real persons existing in real world.

We prepared four conditions with two factors in this experiment by displaying one or four avatars and having character or not as shown in Table 2. In the

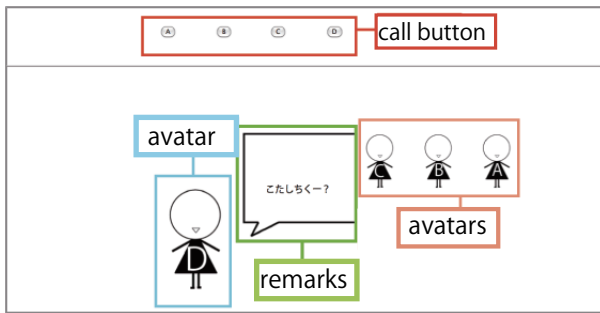


Figure 13: Experimental system for different behaviors and personalities

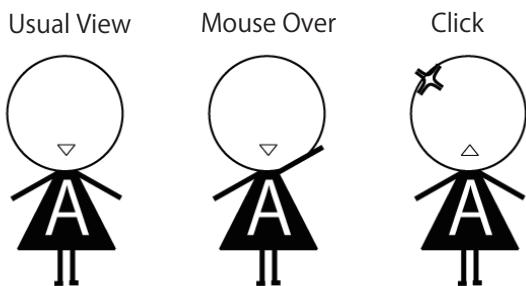


Figure 14: Avatar’s reactions by mouse inputs

cases of the condition 2 and 4, the avatars are lined up at right side. The condition 1 and 3 show only one avatar by the participant’s calls. The characteristics of the avatars were differently expressed by the speed of the reactions to the user’s mouse inputs and the speed of the emergence as shown in Table 3. To observe the results of the experiment without the effects

Table 2: Conditions of experiment two

	one avatar	four avatars
non characteristic	condition 1	condition 2
characteristic	condition 3	condition 4

of the verbal contents, the avatar’s remarks adopted *anagram* to non-verbal information influence.

Table 3: Characteristics of the avatars’ behaviors

	speed of emergence	
	fast	slow
reaction to mouse operation	fast	avatar A
	slow	avatar B
		avatar C
		avatar D

**Evaluation items:** Participants performed five phases of impression rating for each item against four kinds of systems. The participants made an evaluation using a five-point rating scale of the relevance (5: very relevant, 4: somewhat relevant, 3: even, 2: somewhat irrelevant, 1: irrelevant) of the following statements:

1. Avatars showed each avatar’s character.
2. You could feel as though the avatars are representing each different person.
3. You felt as though the avatar which were not called by you listened to the remark of the called avatar.
4. You felt as though the avatar which you called seemed to observe your state.
5. You felt as though the avatar which you called talked to only you.
6. You felt as though the avatar which you called talked to only other avatars.
7. You felt as though the avatar which you called talked to both you and other avatars.
8. The avatars seemed to gather in one place.
9. The avatars seemed to separately stayed in each place.

We examined the results of the subjective evaluations with significant level .05 with repeated measurement by two-factor analysis of variance; the first factor is the existence of characteristics and the second factor is the number of the avatars in the scene.

**Result:** Figure15 shows the results of MOS. There were significances only by the factor of the number of the agent from the results of the statements 3, 4, 6, 7, 8, 9. There were both factors’ significances from the results of the statements 1 and 2. The statement 5 did not show any significance.

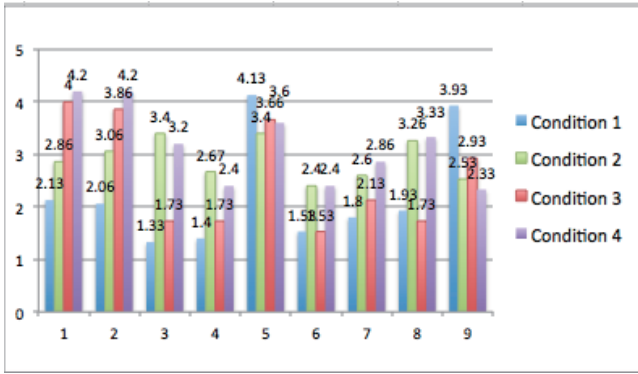


Figure 15: Averages of subjective evaluations for behavioral appearances

There were significances of the interaction between factors from the results of the statements 2 and 3. From the interaction result of the statement 2, it is conjectured that the characteristic reactions and motions can represent different individuals regardless of the number of the simultaneous appearances of the avatar. From the interaction result in the statement 3, it is confirmed that the presences of multiple avatars led a feeling of the other avatars' attentions toward the called avatar regardless of the existence of characteristic behaviors.

**Consideration:** Consideration and discussions on the characteristic behaviors and the number of the avatars' appearances. From these results, we assume that a) the user can recognize the personalities of the avatars regardless of the number of the avatars, but that b) the multiple appearances of the avatars can emphasize the characteristics. We also assume that c) the avatars which are simultaneously appeared are able to show "gathering" situation, and that d) the presences of the avatars which are not shown in the display are perceived as though they are staying in the other place.

### 4.3 Challenges in Future

One of the considerable features in our system is the effectiveness of the multiple avatars' appearances differently from other SNS media with remarks and comments as seen in Twitter, Facebook. The feature is expected to enrich the presence of the users and their communications with time-lag. The users can feel as if there is a communication space among avatars by displaying multiple avatars. Current communications on the web had made the users tired and bored by the time-lags and too many postings. As a result, users are sometimes estranged from their partners. When the avatars of the real person expressing their personalities and presences, the possibility of the continuous communication is expected. We should verify our original motivation to continuously connect the people on the web in future. If the system keeps user's personal relations and interests among the users, the application of the avatars should be explored.

## 5 Conclusion

In this paper, we proposed a method of Web communication enrichment system which enables a feeling of the communication partners with appearances of multiple agents representing each user. The system attaches appearances of personal avatars to each remark based on individual users who made remarks. The avatars are expressing the owners' personalities and the communication among personal avatars. We have evaluated the effectiveness of avatars' appearances. From the results, we could confirm that the participants discriminated each character of individuals by the appearances of the avatars. Next, we examined the effect of the bodily motions to express the personalities and to emphasize their personalities. From the results, we confirmed that the user of our system can discriminate each character / personality by avatar's bodily motions. The multiple avatars' expressions are expected to enrich the presence of the users and their communications with time-lag. We are going to have continuous exploration of the communication from a virtual feeling of the continuous relationship.

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