Study of Communication Aid Which Supports Conversation Held at Railway Station

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Abstract. We are developing a communication aid technique called VUTE (Visual Universal Talking Environment). VUTE aids people who have difficulty in spoken communication such as elderly hard of hearing people, Deaf people and foreigners. Its unique characteristic is that it does not rely on written language but uses motion pictograms. This paper presents the overview of VUTE 2010 that can be used at railway stations and the methodology for designing VUTE 2010. The results of the evaluation experiment of VUTE 2010 will also be discussed.

1 Introduction

We are developing a communication aid technique called VUTE (Visual Universal Talking Environment) that can be activated on a portable cellular device. VUTE can be used by elderly hard of hearing people, Deaf people and foreigners who have difficulty using spoken language.

We developed VUTE 2009, a system that aids people to make emergency calls when there is need for help or rescue in emergencies such as fire, sudden sickness, accidents, etc[1][2]. Following VUTE 2009 we developed VUTE 2010 a communication aid targeting traveler's communication in places such as railway stations.

This paper will report the methodologies for the development of VUTE 2010 such as collecting, classifying, grouping conversation sentences used during travel. Also the design of interface screen and motion pictograms will be explained. The results from our evaluation experiment will also be presented.

2 Design of VUTE 2010

2.1 Guideline for the Design of VUTE

There are 3 basic guidelines that we followed for the design of VUTE: (1) VUTE can be activated on a portable cellular device and this enables connection for database search and output of audio information, (2) VUTE can show motion pictograms, (3) Aspects of manga and expressions used by the Deaf were incorporated in the design of the pictograms. Commonly used pictograms are too

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simple and highly abstract. We believe that by using some aspects of manga the pictograms can be more expressive. Also by observing aspects of the expressions used by the Deaf, we believe that we can make the pictograms more universal and easy to understand.

2.2 Collection, Classification, Grouping of Traveler Conversations

We collected conversations used by foreign travelers in places such as stations and classified and grouped them to find out the general patterns in traveler conversations.

Collecting the traveler conversations
We restricted the collection of traveler conversations into conversation between 2 people, in which "the traveler" asks and "the respondent" answers. Simple greeting and complex conversations were omitted from our data. As a result, 266 conversation sentences remained.

Classification of the traveler conversations
We classified our traveler conversation data into 3 types focusing on "what the traveler basically wishes or hopes to gain from the communication"

1. **Sentences to question**: These sentences are for asking questions wanting to gain some information.
   Eg. *What time is the next express train? / Where is the toilet?*
2. **Sentences to express some desires**: These sentences express desires such as what you want to do and what you want to become.
   Eg. *I want to drink water. / I want to go on the train to* _____ *station.*
3. **Sentences to express trouble**: Sentences to express trouble, danger or something that is unpleasant for the speaker.
   Eg. *I forgot my bag. / There's a suspicious bag.*

If the message of the traveler is transmitted well, they can get some response and help from the respondent maybe using gestures or writing on paper.

Grouping of the traveler conversations
The 3 types of sentences to question, to express some desires, to express trouble were grouped as follows. These are based only on the usage at railway stations.

1. **To question**: Asking for something that the speaker do not understand
   (a) Where is _____ ? (Asking for the place)
   (b) What time is_____ ? (Asking for the time)
   (c) How much is_____ ? (Asking for the cost)
2. **To express some desires**: Want to do something
   (a) Want to buy _____ ? (eg. tickets)
   (b) Want_____ ? (eg. drinks and food)
   (c) Want to ride_____ ? (eg. train)
   (d) Want to go_____ ? (eg. place)

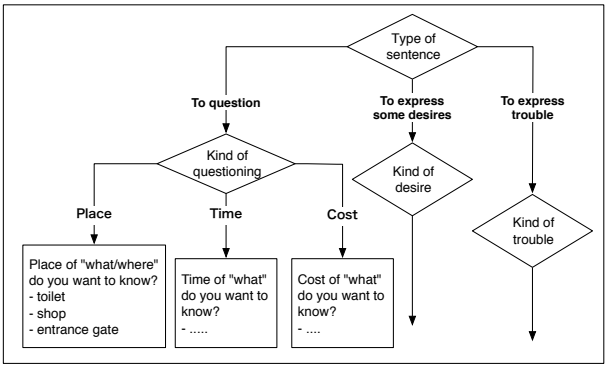

Fig. 1. Part of flowchart of VUTE 2010

3. **To express trouble**: Want to say that the speaker is in a troubled situation
   (a) Troubled situation concerning safety
   (b) Troubled situation concerning luggage/belongings
   (c) Troubled situation concerning the train
   (d) Troubled situation concerning health

For the above 11 groups of sentences, different words or phrases can be inputted into the blank, eg. For (1)-a "Where is _____ ?", words such as *toilet, shop, entrance gate* can be inputted.

Words or information that corresponds to these sentences were then designed into pictograms. By selecting pictograms appropriate for a specific sentence, the information that the speaker wants to transmit were gathered in detail. Part of the flowchart explaining this system is shown on Figure 1. We will call each stage on the flow chart, transaction. All conversations on VUTE 2010 will be formed in a 3 stage transaction.

The first transaction determines "The type of sentences that needs to be transmitted (Type 1, 2 or 3)". The second transaction is for deciding what kind of information needs to be transmitted (Kind (a), (b), (c) or (d)). The third transaction gains information in detail so that the final information can be formed (eg. If asking for the cost of the ticket, additional information such as the types of ticket i.e. express train or local train).

2.3 Design of Agent and Manga Pictograms

The sentences and the transactions described in section 2.2 were then converted into agent animation and pictograms. VUTE 2010 was designed so that each transaction was arranged in a different format so the user can know what stages they are at. If the system is used several times the user can understand how the final information and question is formed. The examples of the screen are shown on Figure 2. VUTE 2010 is a Web application using Flash.

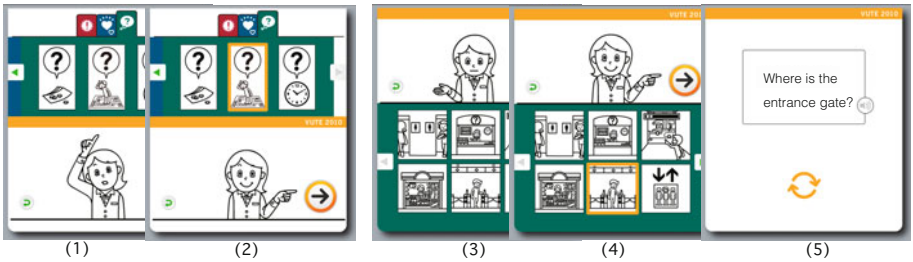

Fig. 2. Screen capture of operating VUTE 2010

3 Evaluation Experiment

Seven Japanese subjects (2 male and 5 female, age 50 to 60) who do not daily use computers were asked to use VUTE 2010 to evaluate whether they can construct the information necessary using the system and to check whether there is any interface trouble.

3.1 Setting the Situation

Before the subjects used VUTE 2010, we had to explain to the subjects so that they can fully understand the situation they are in and what kind of information that they had to transmit. We made up 11 kinds of situations, where the user had to ask someone at the station for something. These situations were written in Japanese. Each situation was printed on one A4 paper and the subjects had to read and understand the contents.

The examples of the situations are (1) I am standing in front of the shop. I want a sandwich, (2) I am standing on the platform of the station. I want to go to the entrance gate, (3) I am standing on the platform of the station. I want to know where the locker is.

3.2 Method of the Experiment

We handed the situation papers to each subjects and asked them to read and fully understand the content. The subjects then used the mouse to select the pictograms of VUTE 2010 so that they can output the final sentence or information. The 11 types of situations were shown to each subject in an order that was set before the experiment and they had to use VUTE 2010 according to each situation. The subjects received no help or direction after the situation paper was shown. The time used by the subjects to complete the output for each situation was recorded.

3.3 Results

All subjects were able to reach the correct output sentence necessary for each situation although some had to repeat or redo the selection of the choices to

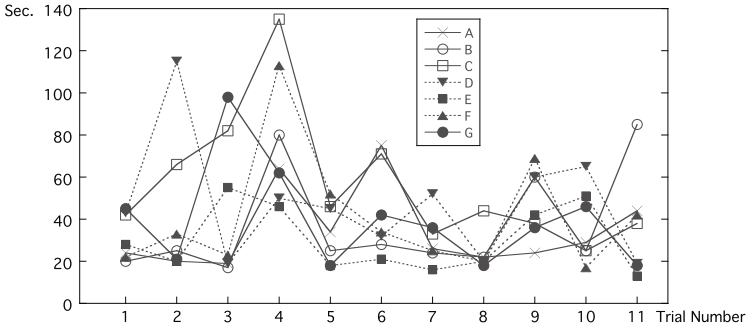

Fig. 3. Transition of accomplishment times for each subject

reach the correct answer. The average time was approximately 41 seconds and those between 15 – 25 seconds were the majority and only few were able to finish in less than 15 seconds.

Figure 3 shows the change in the accomplishment time for each subject. A to G indicates the 7 subjects. The numbers 1 to 11 in horizontal axis indicates the 11 different situations. The accomplishment time (seconds) are plotted along the vertical axis. From Figure 3, it can be found that many subjects had difficulty for situation 4 and situation 9. For these two situations the subjects had to scroll the page to select the pictograms and were complex compared to the other situations. For the other situations there were no big differences. We expected the accomplishment time to decrease as the subjects got used to the system but in this experiment there were no clear results concerning the decrease in time. We also found out from the accomplishment time that some specific pictograms were difficult to understand and we need to improve several parts of the system.

4 Conclusion

From the results of the evaluation experiment, it was found that many users can use this system and output the appropriate information without knowing how to use the system. We were also able to find out parts of VUTE 2010 that needs to be improved to further increase the understanding of the users. This research is granted by the Strategic Information and Communications R&D Promotion Programme (SCOPE) of Ministry of Internal Affairs and Communications, Japan.

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