

# Proposal for a Network Communication Environment to Support Daily Dialogue Between Young Children and Grandparents

Tomomi Sato (Sato.Tomomi@iii.u-tokyo.ac.jp)

Graduate School of Interdisciplinary Information Studies The University of Tokyo, Japan

**ABSTRACT:** This study attempted to build a system environment that would lead to diversification of human relationship by enabling communication between a child and grandparent over a network using a computer. The day-to-day dialogue with a grandparent is realized over the network by employing a medium that would give direction to the dialogue and thereby enliven the communication. Along with presenting the possibilities of ICT to increase the opportunities for communication with people, which is indispensable for a child's development, by increasing the communication with close relatives, the study succeeded in presenting a new relationship with computers for a child that is different from the conventional software for children.

## 1. Background and Objective

### 1. 1. Background

The declining birthrate and trend toward nuclear families increasingly seen in Japan have led to the problem of weakening of the human relationships surrounding children. One of the reasons is that there exists a situation where relationships with grandparents or siblings are not being maintained within the context of the daily family life.

Furthermore, such changes in the social setup are affecting the upbringing of children and insufficient communication skill is being cited as one of the contemporary issues in childhood education.

The childhood development stage is an important phase where the child acquires language skills and builds human relationships, and the family forms the foundation for this stage. In daily life scenarios within the family, communication, starting from mother and child and with various other people, has a significant influence on the development of a child. The decrease in the number of people forming the family leads to less opportunities for communication and this in turn is believed to lead to insufficient communication skills.

This study, targeted at children in their early childhood, aims to construct a network environment, which facilitates the children's interaction with grandparents who live far away and with whom they seldom have a chance to meet (Figure 1).

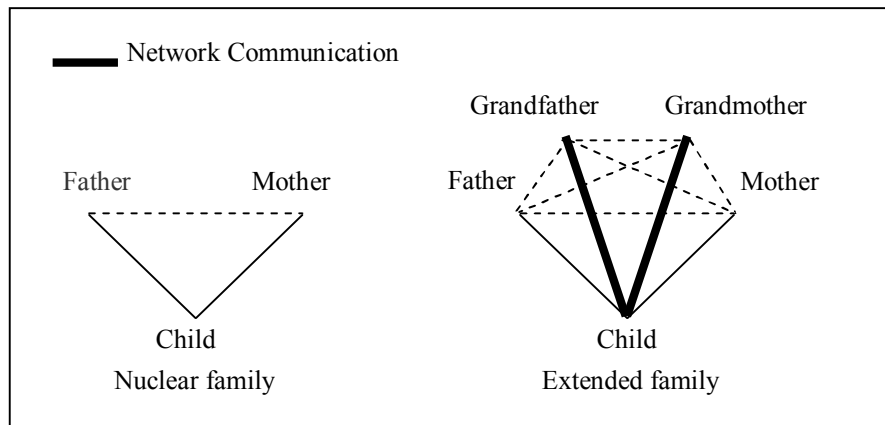
### 1. 2. Objective

According to Vygotsky, the origin of sophisticated mental activities of human beings rests in social activities. Speech, while playing the role of a tool to communicate externally with society, is also considered to be a tool for thinking.

Early childhood is a stage where children start using language in daily life situations and also start expressing their various experiences through language and conveying them to others. This is motivated by the sense of trust and intention established through the pre-linguistic communications with mother as well as various other people from their infancy. And, communication, especially "dialogue," is an activity that aims to enhance sharing of a theme by alternating one's position and the counterpart's between "speaking and listening." In this regard, the reason why the meaning gets conveyed well enough, even if the language context is insufficient, is because the counterpart uses the underlying situational context to receive the words and fills in the unspoken meaning. For a young child, who is still halfway through the language development, it is important to have an adult listener, or "someone close," who can comprehend the unspoken meaning behind the words or the portion for which the child doesn't have the vocabulary by using the clues from the existing familiar relational knowledge (Natsuki, 1977).

The dialogue made with "someone close" on a daily basis is important for the child to acquire language skills, and the acquisition of language skills is thought to lead to communication ability. Therefore, the communication, to be facilitated over the network through this system, aims to generate the daily dialogues of the child in interaction with the grandparents. That dialogue would lead to acquisition of language skills and bring about the

development of communication ability.



**Figure 1:** Family Communication through the Viewpoint of Child

## 2. Study of Day-to-day Dialogue of Young Children

In order to propose an effective style for realizing the dialogue between young children and grandparents over the network, we studied the day-to-day dialogue between young children and adults and applied that knowledge to the system.

### 2.1. Dialogue regarding the experiences at kindergarten

Mothers with children in kindergarten are said to make significant efforts at home to learn the children's experiences at the kindergarten. Through the talks regarding kindergarten life, mothers are thought to compare and link them with the children's likings and their frequently observed actions to construct a contiguous image of the child beyond the space and time constraints (Komatsu, 2003). In other words, the mothers are gathering information for the relational knowledge in a "close relationship" from the topics related to kindergarten life. Furthermore, the joint conversation of the child and the family regarding the child's experience is considered to be important, as it serves as the base for the child to "construct self." In light of the above, it could be surmised that a child talking about his or her kindergarten experiences in day-to-day conversation would promote not only mutual understanding but also promote the construction of self and socialization of the child.

### 2.2. Dialogue through reading of picture books

Reading of picture books to a child is regularly performed at households. Especially, different styles of dialogue develop from reading at home. Even in the case of four-year olds, it functions as a "stage for emotional communication" such as enjoying the mother-child interaction with the "picture book" as an intermediary, and sustains the diversity of conversation topics. And the reading style will reflect the picture book elements (Fujioka, 1995). The picture book can be considered to have the aspect of a medium satisfying the role of an instrument that enlivens the conversation and not just a one-way medium.

### 2.3. Dialogue through play-acting

Play-acting, which is the most conventional form of playing driven by imagination, begins by reproducing parts of real-life experiences. Towards the latter stages of childhood, newer experiences such as relationships, situations and activities involving a larger number of people begin to get introduced into the game. Furthermore, not only own, direct experiences but also knowledge gained from picture books and TV as well as things heard from family members or kindergarten teachers start getting used as material for the game (Uchida, 1989). Play-acting can be considered as a performance of a type of "reflective thinking," where a child selects the most prominent characteristics of his or her world at that particular point of time. Sharing play-acting with a child is thought to enable an adult to gain information on the child's day-to-day activities and at the same time form a mental process for the child where he or she grasps the meaning of experience.

### **3. Advanced Research on Media Communication**

Video conferencing system is to be used as the environment for facilitating the communication in this research.

Video conferencing system is one of the most commonly used tools for interactive learning between schools and it offers a realistic feeling close enough to daily face-to-face communication. In an environment where video conferencing can be used daily, awareness of the other person could be increased by continuously having a number of videoconferences of small durations (Inagaki, 2004). If, however, interaction is done aimlessly under vague themes and objectives, the motivation of the child is said to drop immediately.

For that purpose, a mechanism is necessary for attracting further attention when children use a video conferencing system. The usage of a common electronic blackboard in this remote joint operation is believed to enliven the debate owing to its interactive quality (Obata, 1998). In this regard, this research will employ a catalyst that would constantly invigorate the communication between grandparents and children. We set up a medium to support and enliven the dialogue over a network that can be handled by both children and grandparents.

### **4. Proposal for the Style of Communication to be realized over the Network**

Here, we introduce the style followed by this system in order to realize, over the network, the day-to-day dialogue, important for a child's development, with grandparents who are in a far away place. The style is based on advanced researches on concepts of day-to-day dialogue and media communication.

#### **<Format>**

- A medium to enliven the communication will be set up.
- The medium should be something that promotes an orientation towards sharing day-to-day experiences.

#### **<Style of dialogue>**

- Report day-to-day experiences
- Engage in dialogue that would deepen mutual understanding
- Engage in dialogue based on imagination

The day-to-day dialogue with a grandparent is realized over the network by employing a medium that would give direction to the dialogue and thereby enliven the communication. This day-to-day dialogue is aimed at making the grandparent into "a close person" for the child by enabling them to accumulate the underlying relational knowledge based on the child conveying his or her experiences. At the same time, this becomes a stage for the child to review experiences thereby promoting the construction of self. Moreover, the accumulation of dialogue with "a close person" is believed to lead to the acquisition of language skills.

The aggregation of such day-to-day dialogue is thought to form the base for communication ability.

### **5. Outline of the System Environment**

A system environment that would realize the communication style was constructed. First of all, a network link is established between the grandparent and the child using video conferencing system (NetMeeting). The medium to be used over the video conferencing system is prepared. The following three materials in two formats were created as the medium.

#### **1. Sharing of web page**

- Picture book that promotes speech
- Growth chronicle of cherry tomato

#### **2. Sharing of play-acting space**

### 5.1 Communication that uses web pages as the medium

Web contents are prepared so that the grandparent and child can share them over the network and engage in dialogue (Figure 2).

#### ▼ *Picture book that promotes speech*

A web-based picture book was created so that the grandparent can read it to the child in the course of the dialogue. The contents were incorporated in such a way as to encourage speech, similar to regular picture books. “Mr. Froggy,” the central character, appears and asks questions. The grandparent reads out “Mr. Froggy’s” question from the picture book, the child answers the question and then they proceed to the next page. As “Mr. Froggy’s” comments include familiar things such as sports festival and fights with friends, the conversation would lead to the child reporting the day-to-day activities at kindergarten, etc. to the grandparent.

#### ▼ *Reporting on day-to-day activities*

The communication format is one where the day-to-day happenings themselves are recorded as materials and the child makes the report based on those records.

This time, the growth of a cherry tomato seedling planted in early summer was recorded regularly with camera and the pictures were posted on the web page (Figure 3). The child would make a report to the grandparent by showing that data and the dialogue progresses based on the topic of the growing cherry tomato plant. The periodic reporting of growth is expected to lead to communication that is linked to real-life situations including time-line.

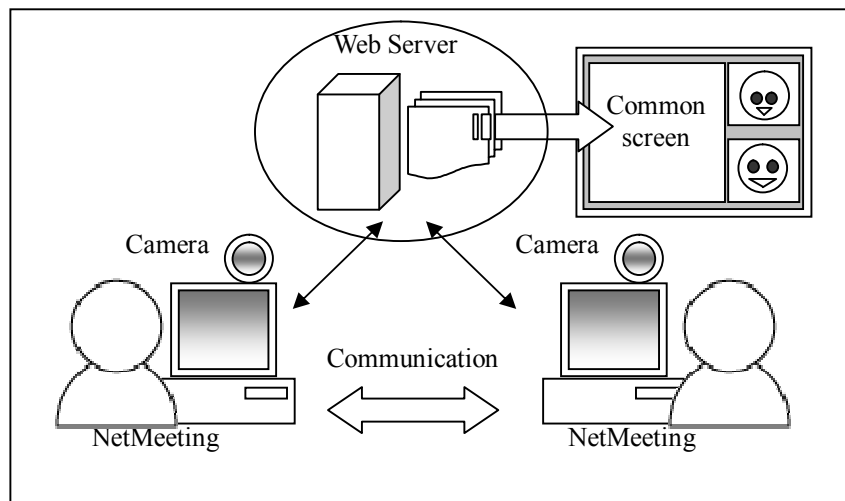


Figure 2: System Configuration Sharing of Web Page

The pictures were posted on the web page regularly

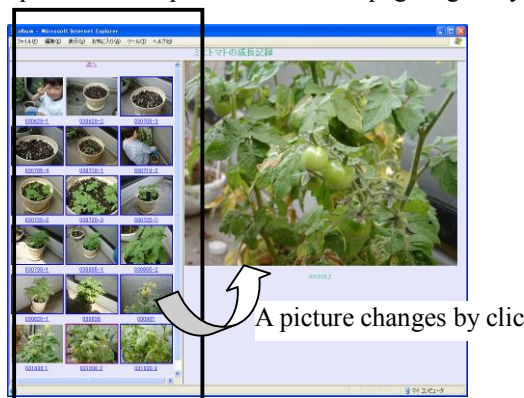


Figure 3: Web Pages of Growth Chronicle of Cherry Tomato

## 5.2 Communication using the play-acting space

This system was built using Director from then Macromedia as a MultiServer system to establish the link between applications in shockwave format and other applications. The same screen will be simultaneously shown to both users through the following method.

- The user performs the operation.
- The operation details are transmitted by the MultiServer.
- MultiServer transmits the operation details to all the client applications connected to the session.
- Client applications display the screen based on the information received from MultiServer.

The application allows various combinations of image, motion, sound, etc. and they can be shared as if in play-acting (Figure 4).

### ▼ Communication using the play-acting space

A play-acting application was created so that the grandparent and the child can freely develop the story. The play-acting space provides the background necessary for developing the character and the story. Characters provided include vehicles such as steam and electric locomotives and backdrops include seasonal scenes.

Using these, each person transforms into the character he or she selected and communication is established by speaking whatever that comes to mind. Then, various new worlds can be created by changing the scenes such as both of them starting an adventure or going out for fun (Figure 5).

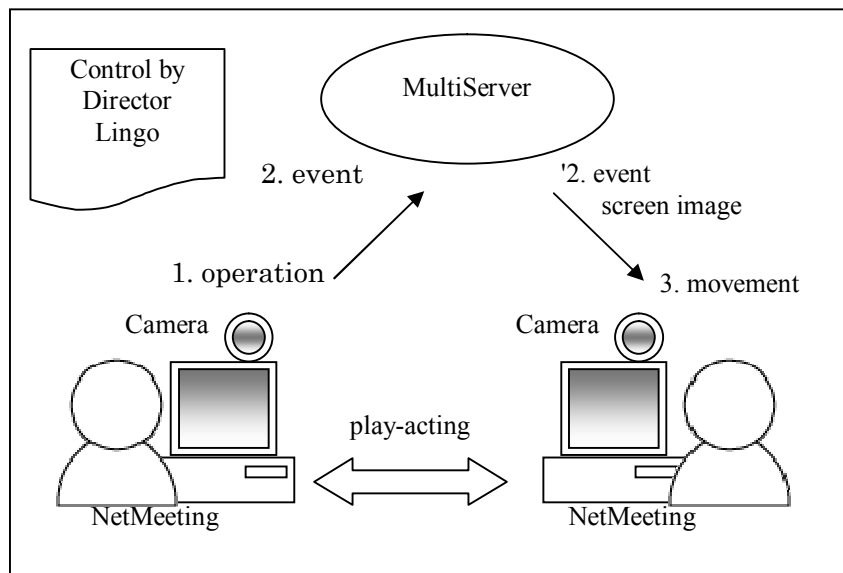


Figure 4: System Configuration Sharing of Contents by the Multi-server

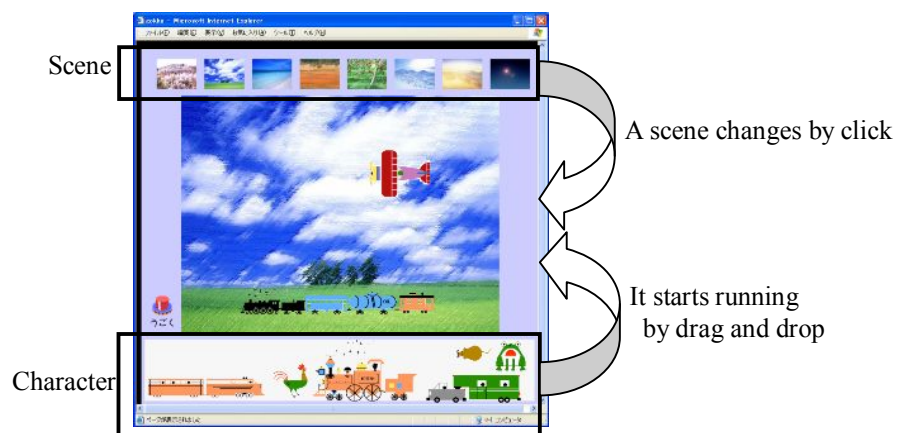


Figure 5: Application of the play-acting space

## 6. Result of the Experiment and Thoughts

We conducted a communication experiment based on this system environment with a four-year old boy and his grandmother. The cherry tomato growth chronicle was used every three weeks for a total of three times and “Let’s play with Mr. Froggy” and the play-acting space were used twice in an interval of a month (Figure 6). No limitation was set on the time and the continuous usage of the contents totaled about 30 minutes (Table 1-3).

This system aims to generate the following forms of dialogue

- Report day-to-day experiences
- Engage in dialogue that deepens mutual understanding
- Engage in dialogue based on imagination

Here, the aforementioned three were identified as categories from the protocols in different media and their frequencies were analyzed (Table 4). By engaging in dialogue constantly through the medium, the conversation was never broken up and the three forms of dialogue came up frequently. All three media share the common aspect that day-to-day experiences can be shared using network communication. In between there were instances where the child’s expression was not audible and the grandparent had to ask repeatedly, but that also decreased as the session progressed. By a gradual process, grandparent as “someone close” could have more the existing familiar relational knowledge of the child.

When grandparents began to use a computer, they could not enjoy it. They have just tried a few games. However, after this experiment, they came to have a mind to know more about the computer. For example, they took a photograph by the digital camera and transmitted photograph data to their computer. On the other hand, a child liked the conversation by this system. He seemed to report his daily life sufficiently. Furthermore, when a child and grandparents met after a long time, they talked happily about many topics. It seemed that they get familiar each other much more than ever.

From these results, I consider that communication via the network between grandparents and a child using this system is effective in order to build the bond of heart. It was difficult to continue this dialog, although both grandparents and a child wanted to do. It is still difficult for them to use this system, so they could not start dialog by themselves. The usability to start dialog have to be improved in the future. And by simplifying the usability, I want to provide this system even for other family. In further study, it is necessary to conduct this experiment in the long run and it is desirable that more children and grandparents participate in the experiment.



**Figure 6:** Experiment Scene of this System

**Table 1 :** The example of a dialog with Picture book that promotes speech

Grandmother	Please let me know about your friends.
Boy	I'll teach you many things. It's Taka-chan and Kaigo-kun.
Grandmother	And who ... ?
Boy	Kano-chan, I want to marry her. A girl is that all.
Grandmother	Well, it's good.

**Table 2 :** The example of a dialog with Growth chronicle of cherry tomato

Grandmother	Did the mini tomato change from yellow flowers?
Boy	It became very much in large numbers.
Grandmother	How many did you count it would be?
Boy	I do not yet count.
Grandmother	Is it in large numbers more from ten pieces?
Grandmother	Do you want to eat this for lunch box early?

**Table 3 :** The example of a dialog with the play-acting space

Boy	Winter. It is winter now.
Grandmother	Is it winter now?
Boy	Everybody of a vehicle went to the skiing area. And they did ski jumping.
Grandmother	Oh, Is it in large numbers?
Boy	They did ski jumping.
Grandmother	Who did?
Boy	Everybody of a vehicle did.
Grandmother	Oh my God! Hahaha.

**Table 4 :** Generating frequency of a dialog

Type of Dialogue	Frequency
Report day-to-day experiences	15
Engage in dialogue that deepens mutual understanding	3
Engage in dialogue based on imagination	8

## 7. Future Issues

In the experiment this time, communication and observation were started after preparing everything, from the test environment to uploading of the photographs for report records, in advance. There is great significance in having continuous communication in order to deepen the mental bond between the child and the grandparent. For that purpose, it is necessary to simplify the report creation as well as the connection setup and application activation. In order to promote the day-to-day dialogue, it's also necessary to constantly enhance the contents by taking into consideration the growth phase of the child. Moreover, the environment should be built taking into consideration the communication style appropriate for the subsequent growth phases of four-year olds.

Also, an interface that wouldn't give stress to the child is indispensable so that the child can keep using the computer as part of his or her daily life. Similarly, the problems faced by the elderly also need to be addressed.

In addition, there are concerns associated with computer usage such as vision deterioration and other physical problems as well as concerns over possible implications of social withdrawal. Taking into consideration the positive and negative aspects of media influence, it's necessary to have voluntary controls such as avoiding excessive usage.

## 8. Summary

This study attempted to build a system environment that would lead to diversification of human relationship by enabling communication between a child and grandparent over a network using a computer. Along with presenting the possibilities of ICT to increase the opportunities for communication with people, which is indispensable for a child's development, by increasing the communication with close relatives, the study succeeded in presenting a new relationship with computers for a child that is different from the conventional software for children.

Furthermore, when educational software is used in such environment, it is also possible for an adult to be close and supervise the child's studies in a situation similar to home education. Such usage can help in casting aside the image of computers as something where a person is immersed on his or her own.

Going forward, we'd like to further study not only contents that would promote conversation but also the kind of developments possible when an adult is involved in and looking after children using the prevailing edutainment software.

## Reference

- Iwata, Junichi et al. (1987-1988) "Iwanami Koza Kyoiku no Hoho / Kotoba to Kyoiku (Language and education)," Iwanami Shoten, Publishers; Tokyo .
- Fujioka, Makiko; Muto, Takashi; Akita, Kiyomi (1995) "Ehon no Yomikikase Sutairu: Shushin-mae no Yomikikase Bamen ni okeru Boshi no Taiwa Bunseki kara (Styles of reading picture books to children: from analysis of dialogue between mothers and children during bedtime reading)," Collected papers from the general meeting of Japanese Association of Educational Psychology (37),392,19950831, Japanese Association of Educational Psychology .
- Uchida, Nobuko (1989) "Yoji Shinrigaku he no Shotai Kodomo no Sekaizukuri Shin Shinrigaku Raiburari (Introduction to Infant Psychology Children's creation of their own worlds New Psychology Library)," SAIENSU-SHA Co., Ltd.
- Vigotsky, L.S. (1987) Problem of general psychology: including the volume Thinking and speech, N.Y.: Plenum Press.
- Obata, Akihiko (1998) "Video and Shared Whiteboard Effects on Remote Cooperative Work (<Special Issue> Networked Collaboration and its Support systems)," Transactions of Information Processing Society of Japan 39(10), 2752-2761, 19981015.
- Komatsu, Koji (2003) "Mother-Child Conversations about Kindergarten Friends, Teachers and Experiences: Conversation Topics and the Characteristics of Children's Speech," THE JAPANESE JOURNAL OF DEVELOPMENTAL PSYCHOLOGY 2003 Vol14, No3, 294-303.