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Title	携帯テレビ電話による空間共有感の実現
Sub Title	A sense of shared space realized by mobile videophone
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Publisher	慶應義塾大学日吉紀要刊行委員会
Publication year	2005
Jtitle	慶應義塾大学日吉紀要. 社会科学 No.15 (2005.) ,p.55- 71
JaLC DOI	
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Notes	
Genre	Departmental Bulletin Paper
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=AN10425830-20050000-0055

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A Sense of Shared Space Realized by Mobile Videophone

Masanao Takeyama

Abstract:

This paper introduces the novel approach of mobile video communication called a Live Vicarious Vision (LVV) in order to improve the degree to which the distant interlocutors feel a sense of shared space. Such a sense of shared place also promotes a conversation and other collaborative activities in a hyperplace, which is an organic coupling of remote activities and places that transcends the limit of functioning and settings of a physical place (Takeyama 2001). In particular, the research focuses on the ability of a LVV to provide an interlocutor of mobile videoconference with the first-person vision and perspective of another distant interlocutor allowing the former to have a vicarious experience of the latter. Based on the experiments to implement a LVV in activities like live reporting and remote navigation, their results are analyzed to reveal several advantages of a LVV. Then a LVV is also applied to a usability assessment of university facilities by students and the facility mangers to examine its practical effectiveness. Finally, this paper discusses geographical implications of these findings regarding the aspects of spatial behavior and cognition as well as their spatial representation and communication.

1. Introduction

As technologies for computing and electronically mediated communication are being integrated into real world places and into human activities there, it is becoming more difficult to distinguish what is real from what is virtual. Indeed, electronically mediated

communication is more and more 'simultaneously embedded in and sustained by systems of physical and material circulation, visual and acoustic communication, and remote interconnection' (Mitchell, 1999). One of the challenges for geographers in the age of ubiquitous and pervasive computing is to provide an appropriate spatial framework to understand and guide such integrations of electronic and physical worlds.

In relation to this, Batty (1997) defines the notion of cyberplace as the embedding of the digital and electronic infrastructure of cyberspace into the physical infrastructure of traditional place in order to distinguish it from the popularized concept of cyberspace. Although this conception of cyberplace emphasizes its spatiality in terms of its infrastructure, we could naturally extend this idea of physical-virtual integration to deal with other aspects of place such as human perception, behaviror, and communication (Adams 1998). For this, Takayema (2001) introduced the notion of *hyperplace* to represent an electronic coupling of remote activities and places that transcends the limit of functioning and settings of a physical place to support and accommodate a complex human activity of a higher order. A typical example of a hyperplace is found in the remote control of Pathfinder on Mars from the NASA station and such an activity is realized in an over-distance place connecting activities and places on Mars and Earth. However, it is important to emphasize that the notion of hyperplace does not describe particularly such space telecommunication or a futuristic science fiction world. The current rapid spread of mobile phones is already helping us to create various hyperplaces in everyday life. A person can negotiate with a remote friend using mobile phone about appropriate meeting place and time dynamically on their way for the meeting. A taxi driver can also talk using a mobile phone to another driver running at some remote place to exchange traffic information about their current places (Townsend, 2000). These behaviors and decision-making are neither realized only in cyberspace nor in a physical place, but in a hyperplace integrating behaviors at different physical places.

The 3G mobile phones recently introduced into the Japanese market are expected to provide their users with more enriched experience of hyperplaces. In particular, these 3G phones equipped with video camera allow us to have an ad-hoc videoconferencing in a more flexible fashion than a traditional videoconference which requires all the interlocutors to sit

staying in front of some special teleconferencing equipments such as monitors, cameras and microphones set up in a room. Mobile videophones do not just realize videoconferences but further help to connect together various kinds of remote activities happening at different types of places in different situations into a more complex activity in a hyperplace.

One of the most important factors in setting up a hyperplace is to create a sense of shared space as a common locale for the conversation and other collaborative activities among remotely interacting people. In the case of text-based online Chat or voice-based telephone conversation, the interlocutors are able to construct such a common ground for conversation by sharing a text space or a voice space where they perceive and produce their expressions in the same representational form. However, research on traditional videoconference reports that many people experience video-conference often feel unpleasantness having difficulty to create a sense of shared space for the conversation. Farr（1991）explains that such a difficulty in a videoconference is mainly caused by the asymmetry between the corporeal expression and its visual representation. In a videoconference, the information disseminated by an interlocutor in the form of facial expression or gesture is received by a remote interlocutor as visual information represented in video images on a screen whereas such visual information is never seen by the interlocutor sending the image. Instead the expression of the interlocutor is recognized by him or her as corporeal information, thus making the sense of expression and the perception of representation independent from or confronting to each other in the conversation. Certainly the video images of an interlocutor could be monitored by the interlocutor oneself by preparing an extra screen for that or by inserting them in the video images receiving from the other interlocutor. However, because people usually do not control their corporeal expressions in a conversation by watching their video images, such dual screens never escape the problem of videoconference. Thus, if we apply mobile video phones to teleconferencing in a similar style to the traditional videoconference, it produces the same kind of difficulty for the interlocutors to realize a sense of shared space in a hyperplace.

This paper introduces the novel approach of mobile video telecommunication called a Live Vicarious Vision（LVV）in order to improve the degree to which the distant interlocutors feel a sense of shared space. Such a sense of space-sharing also promotes a conversation and

other collaborative activities in a hyperplace. In particular, the research focuses on the ability of a LVV to provide an interlocutor of mobile videoconference with the first-person vision and perspective of a remote interlocutor allowing the former to have a vicarious experience of the latter. Based on the experiments to implement a LVV in activities like live reporting and remote navigation, the results are analyzed to reveal its advantages. Then a LVV is also applied to a usability assessment of university facilities by students and the facility mangers in order to explore its practical effectiveness. Finally, this paper discusses geographical implication of these findings regarding the aspects of spatial behavior and cognition as well as their spatial representation and communication.

2. Live Vicarious Vision

2.1 LIVE VICARIOUS VISION

The most significant characteristic of a mobile videoconference that distinguishes it from a usual fixed-style videoconference is seen in the relationship between the video camera and the interlocutor. It is usually the case as for a traditional video conference that a fixed camera set up in a room shoots the face and body of an interlocutor. In the case of mobile videoconference, instead, an interlocutor using mobile phone operates the camera to shoot some object or scene. The camera is fully controlled by the interlocutor by setting its position, direction, and angle at one's own wish. Certainly, when the speaker of a mobile videophone shoots his or her own face, the relationship between the camera and the interlocutor becomes quite similar to those realized in a fixed videoconference. Here, the interlocutor of the one end watches the video images of the other distant interlocutor's facial expression as is the case of a usual videoconference. However, more interesting video images appear once the interlocutor begins to shoot what one is actually looking at with attention in front of his or her face. Because such video images actually represent the perspective and vision of the interlocutor, the interlocutor of the other end watching the video images experiences vicariously the distant interlocutor's spatial perception. This paper studies the possibility of such a vicarious experience mediated by a mobile videophone and calls it as a *Live Vicarious Vision*（LVV）. The adjective "Live" is used here to emphasize the

fact that a person who receives such mobile video images experiences the remote interlocutor's vision vicariously in real-time. In relation to the approach of a LVV, a more advanced technology for a remote vicarious experience is developed and studied by Mann (2001) using a wireless wearable Web camera as a new way of presenting himself to remote audience as "being me" instead of "seeing me". A Live Vicarious Vision realized by a mobile videophone is seen as an early and primitive stage of the development for Mann's Visual Vicarious Soliloquy.

2.2 SLVV AND ALVV

The experience of live vicarious vision (LVV) can be classified into a symmetric LVV (SLVV) and an asymmetric LVV (ALVV) according to how and which interlocutor's vision is experienced vicariously. A SLVV is the situation that each end of interlocutors communicating using mobile videophones sends what he or she shoots to each other. Each of them watches simultaneously the video images of what he or she shoots and what the other party shoots by inserting either image into the other image in the display of the mobile phone. In the case of an ALVV, however, only an end of interlocutors shoots and sends video images while the other end does not shoot any scene but just speaks and watches the video images sent by the counterpart. A SLVV allows both ends of interlocutors to exchange their visions while an ALVV does the interlocutors to share the vision of the one of them. Although both a SLVV and an ALVV are expected to support for creating a hyperplace, this paper focuses only on investigating an ALVV due to the following reasons. First, the sharing of the perspective of one person in an ALVV provides the interlocutors with a common ground or reference point of communication, thus promoting for them to have a sense of shared online place. It is cognitively more difficult for them to establish such a sense in a SLVV because each of the interlocutors has to watches one's own and the other's visions simultaneously. Secondly, the mobile video phones available to use currently in Japan do not have any external audio-video output. In order to record video images and conversations for the later analysis, it is necessary to establish a connection from a mobile videophone to a kind of desktop videophone which has audio-video output. However the camera of a desktop videophone is usually fixed and faces only the interlocutor sitting in front. That requirement

and condition constrain us to work with an ALVV.

2.3 THE SYSTEM FOR IMPLEMENTING ALVV

The system used in this research to implement an ALVV consists of a NTT DoCoMo's 3G mobile videophone, a NTT's desktop videophone, a regular TV monitor, a video recorder, and a distributor which divides audio and video signals output from a desktop video phone into a TV monitor and a video recorder (Figure 1). The 3G mobile phone is used by a person who moves around some places whereas the desktop videophone is used by another person or shared by a group of people staying in a room. In the rest of the paper, the former interlocutor is called a mobile interlocutor and the latter a fixed interlocutor for the sake of argument. The 3G mobile phone and the desktop video phone are linked by switching between the 3G cellular phone line and an ISDN line of the speed 64Kbps because the desktop videophone works only in the ISDN circuit. It is sometimes convenient for a mobile interlocutor to use an earphone-microphone such that one can listen to the other

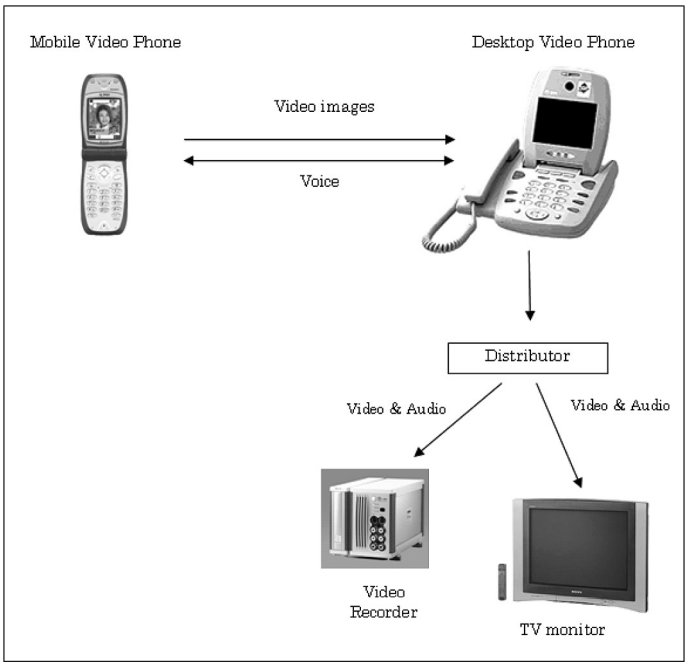

FIGURE1 The system for implementing ALVV

interlocutor's voice clearly with watching the screen of the phone in parallel.

3. Experimenting the Live Vicarious Vision

3.1 THE EXPERIMENTS

This research did some experiments to implement an ALVV in the two kinds of ordinary situations to find out how an ALVV helps actually to create a shared sense of space between remote interlocutors. The one situation is that a mobile interlocutor walking along some sidewalks in a downtown area of Tokyo, reports his or her impression about the landscapes around to fixed interlocutors being in a classroom of a university building located at a different place. In this case, although the both ends of telecommunication talk to each other, the conversation is mainly driven by the mobile interlocutor because the most of topics of conversation are usually found in his or her environment (Figure 2). The other setting to test an ALVV is the situation that fixed interlocutors in a classroom navigate and guide a mobile interlocutor walking in the downtown. Here the initiative of the conversation is taken more often by the fixed interlocutors especially when they have more information and knowledge about the place to navigate than the mobile interlocutor does (Figure 3).

Based on the analyses of recorded video images and transcripts of conversation, several characteristics of an ALVV were revealed regarding its visual and verbal expressions which influence the perceptions and understanding of interlocutors. These characteristics are summarized in the next section.



FIGURE2　The Mobile Interlocutor in Town



FIGURE3　The Fixed Interlocutors in A Classroom

3.2 VISUAL AND VERBAL EXPRESSIONS

3.2.1 Expression of mobile interlocutor's attention and interest

The dynamic changes in zoom, angle, and framing of the video images controlled by the mobile interlocutor represent the dynamic changes of the interlocutor's interest and attention. When the mobile interlocutor finds something interesting in one's environment, he or she usually zooms in or sets a correct angle toward the object of one's interest and fixes the camera at the setting for a while（Figure 4）. On the other hand, when the mobile interlocutor does not focus on any particular object but is looking for something in the surroundings, the camera often pans quickly to the left and to the right until one discovers a new topic of conversation. Also, the shot is sometimes being kept fixed for a while when the mobile interlocutor stops walking to think about something at the place. Then the mobile interlocutor is conscious about something in one's mind. These various visual expressions allow the fixed interlocutor in a room to infer the mobile interlocutor's interest and awareness.

3.2.2 Video images as the mobile interlocutor's corporeal expression

When the mobile interlocutor shooting scenes moves one's body or just walks somewhere, the shaking movie images naturally caused by such a motion or walk produce a sense of vicarious moving or walking experience in the minds of distant fixed interlocutors. Another vicarious experience is also created impressively in the fixed interlocutors to see the hand of the mobile interlocutor appeared in the frame of a scene when they feel as if the hand is their own. Such a situation happens especially when the mobile interlocutor tries to grasp or touch some object before his or her face. Thus, the video images of an ALVV are not detached objective representation of an environment but are highly subjective



FIGURE4　The Video Images Representing The Interlocutor's Attention

representation of one's first-person perception (Figure 5). Actually these kinds of visual expression to create vicarious sensations are often used intentionally in films. But the live and personal conversation with the camera operator which never happens in usual films makes the experience of an ALVV in a hyperplace very unique.

3.2.3 Usage of reference terms

When the fixed interlocutors watch the video images, they have a sense of being located and orientated in the same way as the mobile interlocutor does in the distant environment. Such a matching in orientation between presence and telepresence promotes their use of reference terms in the conversation. Both sides of the interlocutors communicate to each other using demonstrative pronouns such as "it", "that", "here", and "there" and also terms for orientation like "left", "right", "front", and "back". For example, a fixed interlocutor navigates successfully the mobile interlocutor by the expression "Please turn left right at

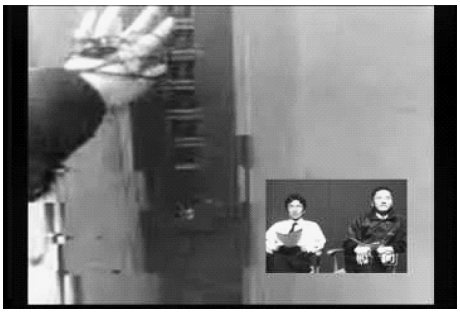

FIGURE5　A Vicarious Experience

that corner." However, these usages of reference terms in the conversation sometimes produce confusion when the mobile interlocutor shoots a scene from an angle different from his or her face's orientation. Also when the mobile interlocutor is looking around his environment but not watching the video images on the display of the mobile phone, the both ends of interlocutors lose a common reference ground to locate and orient themselves. For example, when the mobile interlocutor does not watch the video image, the expression "Please move for the direction where that yellow car parks!" uttered by a fixed interlocutor, who notices that only the referred yellow car appears in the video image, does not allow the mobile interlocutor seeing more than two yellow cars around to specify the direction.

3.3 EXCHANGE OF KNOWLEDGE AND EXPERIENCES

An ALVV provides the different ends of interlocutors with different kinds of experiences. The fixed interlocutor watching the video image sent from the mobile interlocutor's perspective has a live vicarious experience of the latter. Such a sense of shared experience and environment does not just help him or her to understand the mobile interlocutor's awareness, concerns, and utterances in the conversation. It is also found that when the fixed interlocutor has some knowledge or experience about the place where the mobile interlocutor is visiting, an ALVV promotes their conversation much better. Indeed when the video images evoke the fixed interlocutor's knowledge or the memory of past experience of visiting the environment, an ALVV stimulates the interlocutors to exchange their experiences of which one is currently happening for a mobile interlocutor and the other is being reminded of from the fixed interlocutor's memory of the past. Such an exchange of

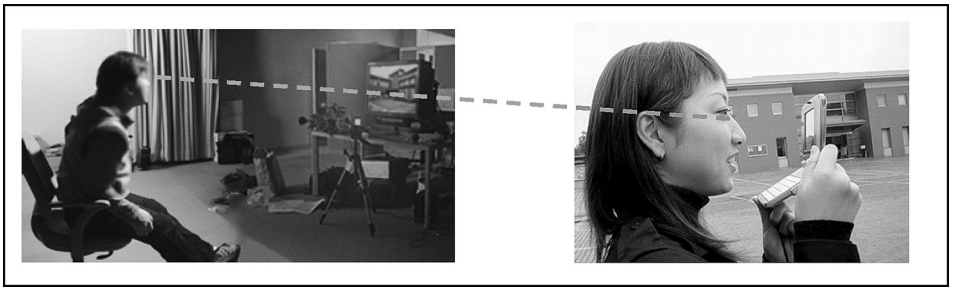

FIGURE6　The Facility Manager(left) and Students with Mobile Videohone (right)

experiences gives an opportunity for a fixed interlocutor to reinterpret one's past experiences by comparing these with the currently observed experience of the mobile interlocutor. On the other hand, the conversation produces a kind of augmented reality for the mobile interlocutor walking in field by overlaying other person's knowledge and past experience on his or her live real-world experience.

4. Collaborative assessment of university facilities in a hyperplace

4.1 DISCUSSION ON THE CAMPUS FACILITIES

The results of the experiments to implement an ALVV clarifies that an ALVV is effective for the interlocutors to understand each other's perspective and experience of an environment. To explore the applicability of an ALVV having such desirable characteristic to a more practical purpose, an ALVV was implemented in a project for assessing the usability of university facilities by the students and facility managers. Instead of using the popular inquiry techniques like questionnaires and interviews, in this project, students with mobile videophones walk through the university campus to report their impressions about facilities which they use in their daily lives. The facility managers of the university campus sit in a meeting room in the campus to watch a live audio-visual report from the students and ask them appropriate questions interactively (Figure 6). The testing site is a small university campus in the city of Yokohama in Japan accommodating less than two thousand students and the faculty members and staffs. The campus has several major facilities including classroom buildings, computer labs, a library, a cafeteria, and a courtyard. One session of the

usability assessment is carried out by a few pair of students during around 40 minutes walk and conversation. Some typical cases of conversation over mobile video conference between the students and the facility managers were observed in this project as below.

1) The students report the managers their ordinary uses and the impressions about the facilities. For this, the students shoot scenes with their mobile videophones to demonstrate how they actually use the facilities from their first-person perspectives. Also, the students sometimes happen to meet their friends during the live report session and start to ask these friends about their opinions about the facilities. Because such interaction among students are presented in the video images from the reporters' first-person perspectives, the managers watching the video images feel as if they were themselves talking to the students' friends.

2) The facility managers explain the students about the concepts and philosophies of campus facility planning. Such explanations are invoked when the managers find some particular facility of their concerns in the video image or when a student asks a question about it. Students were sometimes surprised to know the facilities in campus which they did not know how to use.

3) The students and the managers collaborate on exchanging their ideas to improve and upgrade the usability of the campus facilities. For example, they discussed together about an appropriate place to set up a new electronic bulletin board in the library building. A student walked around in the library building proposed a place to set it up by showing how the bulletin board would actually be seen from his or her proposed standpoint by using the mobile videophone.

4.2 MERITS OF USING ALVV

Several merits of applying an ALVV to assessing the usability of facilities are found out by analyzing the recorded video images and transcripts of conversation in the project. These are summarized as follows.

1）A LVV helps eliciting concerns and awareness from the user.

The users do not always recognize their ideas and opinions about the facilities clearly enough to explain to other people because their awareness about the ordinary environment is often in their subconscious mind. However, once the users go to the actual site of facility where they are asked by the manager about their ordinary uses and impressions, their tacit concerns are elicited clearly in their mind.

2）Situated expression of situated knowledge

Even if a user notices about one's impression clearly, it is not always easy for him or her to explain exactly what he or she feels in appropriate words. This is because such senses and awareness are usually embedded in the complex interaction between the user and the environment. An ALVV visualizes the user's situated senses and knowledge efficiently by video images to complement one's verbal explanation to the manager.

3）Promoting mutual learning

While an ALVV promotes the learning of the facility manager about the user's awareness, the user also learns some knowledge for the conversation with the manager. In particular, when the user is asked to match one's focus of vision to the manager's target of attention by controlling the position and angle of the camera of mobile videophone, the user in turn experiences the manager's perspective vicariously to understand more sympathetically what the manager explains.

4）Stimulating the discussion afterwards

The experience of LVV shared among the students and the managers also stimulates a face to face conversation after the project. The shared experience of collaborating in a hyperplace, which links a meeting room and places in the campus through the audio-visual cyberspace, provides a common set of topics of discussion and also background for further conversation.

5. A Live Vicarious Vision and geography

The findings of the experiments of an ALVV explained above are now examined below from the viewpoint of geography focusing on the novel aspects of an ALVV as geographic

representation and communication as well as placeness to realize them.

5.1 REPRESENTATION OF SPATIAL PERCEPTION AND AWARENESS

1) First-person geography of daily life

Mobile phones equipped with a digital still camera, which are already spread widely in Japanese teenagers, are often used to exchange instantly among friends the photos of their personal happenings of daily life from their first-person perspectives. Video images shot by a mobile videophone can be also seen as more dynamic representations of a first-person geographic vision. Certainly photographs and videos shot by regular handy cameras are also used to express images of landscapes from a personal perspective as seen in personal photo and movie essays. However, since a mobile phone is used as a highly personal and intimate communication medium (Kay 1991), it is expected to be a more appropriate tool to visualize one's perception of ordinary environment. In addition, its small size and lightness help its user to carry it everywhere and shoot scenes easily even while walking.

2) Cognitive geography of dynamic corporeal expression

As is mentioned earlier, the dynamic scene created by a mobile videophone reflects the body movement of the phone user. More precisely, it is reflecting the dynamic change in the spatial and perceptual relationship between the user and environment. In this sense, the video images of scenes captured by a mobile videophone are seen as the user's corporeal expressions and also as representations of the affordances of the environment for the user (Gibson 1987). Therefore, video images shot by a mobile videophone, which could be recorded in a tape or disk, are expected to be used as another kind of "cognitive map" for the analysis of spatial perception and cognition.

5.2 INTER-SUBJECTIVE GEOGRAPHIC CONVERSATION

1) Inter-subjective spatial understanding

The first-person video images shot by a person with a mobile videophone are watched by a remote person in real-time. Besides, the mobile videophone allows people to speak to each other with sharing these video images over distance. As summarized in the last chapter, such a Live Vicarious Vision promotes a conversation between distant interlocutors by

sharing and exchanging their current and past experiences about a place. Their awareness of the place is influenced from each other and also developed collaboratively through the conversation. Thus, a LVV provides us with novel techniques and opportunities for inter-subjective perception and understanding of neighborhoods and landscapes.

2) For urban planning and marketing research

Exchanging in perspectives of environment and landscapes among citizens is a very important process for urban design and planning. However, it is sometimes not easy for people to communicate others about their concerns of a place or facilities not necessarily because of differences in interest and perspectives among them but because they do not recognize how these are different from each other. By visualizing the attention and interest of each person and situating these in an actual environment, an LVV allows people to notice the difference more easily, thus helping their exchange and understanding of ideas and opinions. Of particular effective use of an LVV in urban planning is to let the designers and planners have a vicarious experience of citizens' behavior and perceptions.

Also in an area of marketing research, understanding how passengers perceive and are impressed by advertising display is very important for assessing their effectiveness. An ALVV session as carried out in this research can be applied to such a study by letting consumers report on live with mobile videophones about their perceptions of advertisement while walking in downtown or in some retail facilities. The researchers in some distant place watching the live report could ask the consumer questions interactively without too much intervention. Or the researchers could also let other consumers monitor the video images to exchange their impressions with the consumers in a field and listen to analyze their conversation. One of the advantages of applying a LVV to such a marketing research is to extract information from consumers' subconscious through the vicarious experience and the dialog among consumers and researchers.

5.3 ORGANIC INTEGRATION OF DISTANT ACTIVITIES

From a geographical viewpoint, it is very important to emphasize the fact that human spatial behavior, cognition, and their visual representations and communication are all happening simultaneously and are coherently integrated into a conversation over LVVs as

implemented in this research. Traditionally in geography, however, these are seen as more or less independent from each other and being able to analyze separately though it studies the relationship between them in various aspects. An interactive conversation over a LVV, integrating these by applying mobile video communication, is seen a new mode of geographical knowing of people and their environment. The characteristic of such knowing is to discover spatial knowledge in and through the ongoing process of inter-subjective vicarious experience and conversation.

In which space, then, is the mode of geographical knowing made possible? The notion of a hyperplace is introduced in the previous research（Takeyama 2001）to understand conceptually the spatiality of such an interactive activity extended over distance realized by an organic coupling of different human actions of different people located at different places. One of the approaches to implement such a real-time and over-distance activity is to apply a mobile videophone as experimented in this research. The advantage of a mobile videophone is to link dynamically a person's spatial behavior and perception with video images accessible by a remote person in order create a sense of vicarious experience in the latter. While these persons are physically distanced, they can be cognitively very close to each other enough to feel a sense of shared place over the distance.

6. Conclusion

The novel approach of mobile video communication called a Live Vicarious Vision（LVV）was introduced in this paper to improve the degree to which the distant people feel a sense of shared space, thus promoting their conversation and other collaborative activities in a hyperplace. The results of the experiments to implement an asymmetric LVV（ALVV）revealed that the visual and verbal expressions seen in the conversation over an ALVV are effective to produce a sense of shared space among the interlocutors which stimulates the exchange in their knowledge and experiences of a place. To explore the applicability of an ALVV to a more practical purpose, an ALVV was used in a project for assessing the usability of university facilities by the students and facility managers. The result of the project clarified that an ALVV helps the students and managers to understand, explain, and learn

each other's awareness of facilities. Based on the finding of these experiments, the nature of an ALVV was examined from a geographical viewpoint regarding the aspects of spatial behavior and cognition as well as their representation and communication. The idea brought from such an examination is that a hyperplace mediated by an ALVV is seen as a locale for a new mode of geographical knowing to discover spatial knowledge in and through the ongoing process of inter-subjective vicarious experience and conversation.

References

Adams, P. (1998) Network topologies and virtual place. Annals of the Association of American Geographers, 88(1), 88–106.

Batty, M. (1997) Virtual geography. Futures, 29(4/5), 337–352.

Farr, R. (1991) Bodies and voices in dialogue. In I. Markova and K. Foppa (eds.) Asymmetries in dialogue. Rowman & Littlefield, Oxford.

Gibson, J. (1986) Ecological approach to visual perception. Lawrence Erlbaum, Hillsdale, N.J.

Kay, A. (1991) Computers, networks, and education. Scientific American, 265, pp.100–107.

Mann, S. (2001) Cyborg: digital destiny and human possibility in the age of the wearable computer. Random House.

Mitchell, W. (1999) E-topia: "urban life, Jim-but not as we know it". MIT Press, Cambridge, Mass.

Takeyama, M. (2001) Geographical conceptualization of cyberplaces. GeoJournal, 53(4), 419–426.

Townsend, M. (2000) Life in real-time city: mobile telephones and urban metabolism. Journal of Urban Technology, 7(2), 85–104.