Community-based Interpretive Schemes: Exploring the Use of Cyber Meetings within a Global Organization

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ABSTRACT
This paper explores the challenges of adopting a personal-computer-based meeting technology in several geographically dispersed units of a global organization. We use community-based interpretive schemes as an analytic lens for examining community assumptions and expectations about genre, technology and culture, and how they shaped use of the technology over time.

Keywords
groupware, interpretive scheme, genre, technology, culture, global organization, cyber space

INTRODUCTION
As the Internet comes into widespread use all over the world, and many businesses extend markets into a worldwide sphere, personal-computer-based (PC-based) meeting system should become increasingly popular for business activities. PC-based meeting systems have advantages in cost, user involvement and accessibility vis-a-vis video conferencing systems, because PCs are much cheaper than video conference facilities, are used daily by most people in organizations, and can connect with unlimited other PCs physically through the Internet. Though cyber spaces such as MUDs (Multi-User Dimensions) and MOOs (MUD Object-Oriented) have been used for socializing and game-playing by online enthusiasts [6], more recently cyber spaces are beginning to be used for business meetings because of their technological characteristics [e.g. 5, 11, 27].

The more diverse the organization adopting cyber space for business use, the more severe may be the problems Grudin [15] identifies: a "disparity in work and benefit," "disruption in social processes," and the "adoption process." Thus, when a groupware such as a PC-based meeting system is introduced in global or virtual organizations [7] where people use a network to collaborate, it is more difficult to integrate the technology into work practices. A growing body of empirical research has examined how use of groupware influences organization practices, but there are not many empirical studies of the implementation of groupware in global organizations [e.g. 23], and especially few studies in cross-organizational and cross-national settings [17].

In this paper, we report on a case involving a technology implemented for PC-based meeting systems in several geographically dispersed units of a global organization. We use a community-based notion of interpretive schemes as an analytic lens for examining assumptions and expectations about genre, technology and culture, and how these shaped use of the technology over time and across sites.

In the following sections, we first introduce some theoretical background on community-based interpretive schemes, then describe the research study, and conclude with some implications for implementing meeting technologies in global organizations.

THEORETICAL LENS
Our analytic lens draws on social cognitive research that has argued that people act in the world on the basis of how they make sense of it [30]. Such an interpretive influence is also evident in the context of communities or organizations, where members' interpretations (or interpretive schemes [12]) shape how they assign meaning to and take action within their communities or organizations [2, 13].

The role of interpretive schemes in shaping people's action typically operates in the background, and is rarely surfaced, discussed, or reflected on. Interpretive schemes have both enabling and constraining effects [12]. On the one hand, interpretive schemes are enabling as they guide organizational action, allow interpretation of ambiguous situations, and reduce uncertainty in conditions of complexity and change [13]. On the other hand, interpretive schemes are also constraining as they reinforce unreflective reliance on established assumptions and knowledge, limit learning, and distort information to make it fit existing assumptions and expectations, possibly even creating self-fulfilling prophecies.

Members of a community or organization transmit interpretive schemes to others—especially new members—through training and socialization [29]. Likewise, regular social interaction, working relationships, and negotiation over time create opportunities for the development and exchange of similar points of view [14]. Thus, membership and participation in a community influences the particular set of interests, beliefs, and norms to which members are exposed [29], and helps to create a shared set of assumptions, expectations, and knowledge, which we refer to as "community-based interpretive schemes."

Studies of the use of technology have found that interpretive schemes powerfully shaped how people actually interact with technologies in their work [1, 20, 22]. This influence exists because in order to engage with technology, people have to make sense of it. And in this sensemaking process, people draw on their existing assumptions, expectations, and knowledge about the technology and what counts as appropriate action within their community. In this way, community-based interpretive schemes serve to shape people's action towards and use of technology.

The research we report in this paper suggests that community-based interpretive schemes were influential in shaping people's use of a new PC-based meeting technology. In particular, we found that community-based interpretive schemes were particularly salient in three areas: genres, technology, and culture. We explore each in turn.

Genre

Genres of organizational communication, derived from the notion of literary genres such as the novel or drama, are types of communication well recognized in a community—for example, the report, the proposal (or, more specifically, the NSF proposal) and the meeting [32]. Recently, genre has been used as an analytic lens for examining a range of electronic communication [4, 9, 10, 21, 33]. In this context, we are particularly interested in examining participants' interpretive schemes around genres. That is, what assumptions, expectations, and knowledge do participants have about the genres they enact within their community, and how do these influence their use of a new meeting technology.

Researchers have found that as people begin to use new collaborative technologies, they are influenced by their knowledge of genres they are currently using within their community [33]. Once they have experienced a new medium, their newly gained knowledge of it and how it can be used reshapes their assumptions and expectations of which genres may be used and how they may be adapted to take advantage of the features of the new medium. For example, the participants in the Common LISP project described by Orlikowski and Yates [21] brought to their use of e-mail shared interpretive schemes around appropriate communication genres to use in their collective task. Where common and community-wide interpretive schemes do not exist around appropriate genres to use in a given situation, misunderstandings may arise if incongruencies among interpretive schemes are not in some way mediated [33].

Technology

A number of researchers have focused on the assumptions, expectations, and knowledge people use to understand technology in organizations [20, 22, 31]. Such research suggests that different groups within an organization may have different interpretive schemes about a particular technology. This variance tends to arise as a result of group members having different roles, experiences, and knowledge with respect to the technology. For example, in one case where the groupware technology, *Notes,* was implemented in a large professional firm in US, Orlikowski and Gash [20] found that user and technologist groups developed quite different interpretive schemes about *Notes.* These differences were seen to reflect the groups' different work practices, social norms, and schedules. This incongruence in interpretive schemes across the two groups within the larger community helped to explain why the firm's initial deployment of *Notes* did not yield the anticipated benefits.

Interpretive schemes about technology include at least the following aspects: assumptions and expectations about what the technology is; assumptions and expectations about why the technology has been adopted; and assumptions and expectations of how the technology should be used. As we will see below, where differences across these three aspects exist, group members may have difficulty agreeing on and enacting effective ways of engaging with the technology within their community.

Culture

Culture has been studied at a number of levels: national [16], corporate [24], and occupational [28]. Within communities using collaborative tools, cultural interpretations exist at all of these levels, from national and linguistic to corporate, unit, and role or profession. On the national level, groups or group members from one national culture may see members of other national cultures as having a particular characteristic, in contrast with members of other national cultures (e.g., American efficiency vs. Japanese emphasis on relationship-building). Moreover, as English becomes the dominant language on the Internet, non-native English speakers often feel some difficulty in communicating via the Internet, increasing the cultural barriers. Geographical location (and time zone) of sites in different countries may also be a significant component of culture.

Cultural expectations also surround differing corporate and business unit culture. In one study [33], researchers found that even within the R & D operations of a single global firm, different norms existed among members of a group who came from different units. Community members who belong to a single unit may have expectations about their own unit in contrast to other units (e.g., research vs.

marketing cultures), and when communities using an Internet-based tool are from different units, these contrasting expectations are perceived as another layer of cultural difference. Even members in different roles or professions within a single unit may have differing cultural expectations. For example, Dubinskas [8] found that managers in a unit had a closed, short-term orientation, while scientists in the same unit had an open-ended, long-term orientation.

At all these levels of culture, from national to corporate/unit to role, members of a community will have interpretive schemes. Whether these are shared throughout the community depends in great part on whether membership in it crosses such lines. Clashing cultural expectations should lead to problematic differences in interpretive schemes.

RESEARCH SETTING AND METHOD

Research setting

We investigated a collaborative system designed to host distributed electronic meetings among the geographically dispersed sites of a large global Japanese firm, Toki Corporation (a pseudonym). The sites involved include Toki's research lab in Japan, designated Toki HQ; its research center in the US, designated Toki US; and three sites in Singapore and Australia, collectively designated as Toki APG (Asia Pacific group). Together, we refer to these sites as the Toki group. The cyber space used by these sites is The Palace [26], a two-dimensional graphical MOO environment, which offers the following facilities: avatars, sound, a shared white board, and various chat room functions including text chat. The Palace system, like other MOOs and MUDs, has been used primarily for social chats in online network communities, but the Toki group has held over 20 scheduled synchronous meetings in the cyber space over two years, and refers to this new type of electronic meeting as Cyber Meetings. Both managers and researchers from Toki HQ and Toki US participated in the Cyber Meetings, while only managers from Toki APG participated. Two American researchers at Toki US and a Japanese researcher at Toki HQ were involved in most Cyber Meetings, while others participated more sporadically. Below, we provide a brief history of the Cyber Meetings.

Early phase: 07/97 to 07/98

Nine months after Toki US set up a Palace server and began to use it for collaborations within the lab, the first Cyber Meeting between Toki HQ and Toki US was held in July 1997. Five Americans at Toki US, and 12 Japanese at Toki HQ participated in the meeting, during which they introduced themselves and tested Palace functions such as rooms and avatars. After several Cyber Meetings between the two locations, the Japanese chairman of Toki US planned to demonstrate the research technologies of Toki US in a directors' meeting at Toki HQ, using the Palace (hereafter referred to as the Cyber Meeting Research Demo Meeting). Five Japanese at Toki HQ cooperated with Toki US to plan the demonstration. Before this demo, they rehearsed the chairman's scenario several times. An American researcher set up rooms and scripts, and an American senior researcher presented the research themes of Toki US using text as well as distinctive features of the Palace such as avatars, rooms, linkage of presentation documents to web pages, and so on. The Cyber Meeting Research Demo Meeting occurred in July 1998, completing the early phase of Palace use at Toki group.

Middle phase: 10/98 to 02/99

Members at Toki HQ and Toki US wanted to continue interacting and they decided to hold regular Cyber Meetings following the Research Demo Meeting. After Toki US introduced the Palace system to a site in Toki APG in December 1998, two meetings among Toki HQ, Toki US and Toki APG were held in January and February, including a Toki HQ researcher's presentation of his research projects.

In January 1999, the chairman of Toki US proposed to hold a Cyber Meeting only among Japanese participants. This meeting was conducted in the Japanese language, and involved the chairman and a manager from Toki US (both of whom are Japanese), joined by a researcher and two managers from Toki HQ (all of whom are Japanase).

Last phase: 06/99 to 09/99

As a major participant at Toki US and the major participant in Toki HQ planned business trips to Toki APG in July 1999, they held several Cyber Meetings among Toki HQ, Toki US and Toki APG to make arrangements for the business trips.

When another major participant planned to leave Toki US in August 1999, two researches at Toki US and a researcher at Toki HQ held two meetings in order to solve an installation problem concerning a software developed at Toki, and make the transition from the major participant to another researcher at Toki US.

The last Cyber Meeting was held in September 1999 to develop the agenda for a business trip to Toki HQ of a participant at Toki US. Two participants from Toki US and three participants from Toki HQ joined the meeting. At this meeting, all participants except the major participant at Toki US were Japanese.

Research method

Our data are drawn from multiple sources: complete text logs of nine Cyber Meetings from all three phases, e-mail archives of messages associated with these meetings, as well as semi-structured interviews and a survey conducted with the participants. One author also observed two Cyber Meetings in June 1999 to observe the interaction of participants directly and in real time. In addition, we obtained videotapes of three face-to-face meetings between members of Toki HQ and Toki US in order to compare meetings conducted in different media.

The text logs include almost 3000 utterances in nine meetings. According to these logs, members of Toki HQ contributed to eight meetings, members of Toki US contributed to all nine meeting, and members of Toki APG contributed to four meeting. Americans from Toki US were involved in eight meetings, Japanese from Toki HQ or Toki US were involved in all nine meetings, and members of Toki APG from Singapore and Australia were involved in four meetings

The e-mail archives provided by a major participant at Toki HQ consist of over 600 English or Japanese messages exchanged since the early phase of Cyber Meeting use. The semi-structured interviews were conducted by one of the authors with 10 Toki HQ and Toki US participants (in English and Japanese, depending on the native language of the interviewee). The author interviewed five participants at Toki HQ (all Japanese) in June 1999, and five participants at Toki US (three Americans and two Japanese) in March 1999. The interviewees include all the major participants who participated in the Cyber Meetings more than 20 times both at Toki HQ and Toki US.

Finally, a written survey (in either English or Japanese) was sent to all 25 participants of the Cyber Meeting in the Toki group in March 2000. We received 19 responses (76%): 8 out of 10 at Toki HQ, 6 out of 10 at Toki US, and 5 out of 5 at Toki APG. Everyone who participated in the Cyber Meeting more than three times, with the exception of one person who left the firm and the CEO of Toki US, responded to our survey.

We analyzed these data both quantitatively and qualitatively. Analyzing the utterances, we developed a coding scheme based on the two dimensions of genre: purpose and form. Purpose categories reflect the socially recognized communicative purposes of utterances (e.g., response, presentation), topical thread (e.g., research activities) (see [18] for similar coding by threads), and content type (e.g., task-related content). Form categories reflect the formatting features of the utterance (e.g., ellipses) and functional features of the Palace (e.g., sound, room movement, talking balloons). Using the coding scheme, we coded each utterance in the text logs of the nine Cyber Meetings. The coding results were used to determine whether we could identify patterns of usage or common genres in the use of the Cyber Meetings.

The interview data and the survey data helped us understand the participants' assumptions and expectations about their genres of communication, culture, and technology.

RESULTS

The survey showed that some participants of the Cyber Meetings expected that the Palace or similar media would become effective communication tools for geographically-dispersed firms, but others, including two major participants, did not expect this to happen. The survey also showed that the participants thought differently about the Cyber Meetings and how they should be used. In addition, analysis of use patterns indicates that no shared community-wide interpretive schemes emerged around appropriate genres to use in the Cyber Meeting technology, both across various national cultures and geographic sites. In this section, we examine interpretive schemes about genre, technology and culture to explore the reasons for these findings.

Genre

Genre purpose and form

Our coding results show that the nine Cyber Meetings were used for a variety of purposes ranging from research presentations to setting the agenda for a business trip (see Table 1). In addition, whatever the overall purpose of the meeting, multiple topics were covered.

Table.1 Primary Purpose of Cyber Meetings

Date	Primary purpose
07/09/98	Rehearsal of Cyber Meeting Research Demo Meeting
11/11/98	Exchange of current activities between Toki HQ and Toki US
12/07/98	Palace introduction to Toki APG
01/25/99	Research presentation by a researcher at Toki HQ
01/27/99	Discussion of how to use Palace for business
02/25/99	Research presentation by a researcher at Toki HQ
06/23/99	Business trip planning for participants at Toki HQ and Toki US
08/12/99	Diagnosis of a prototype software installation problems
09/01/99	Business trip planning for a participant at Toki US

Responses to the survey also indicated that participants within and across the various sites had different views of the most appropriate purpose for Cyber Meetings:

> Planning agendas that involve setting many details among many people (Toki US researcher)
>
> Problem solving and discussions of mutual interests (Toki US researcher)
>
> Daily short informal chat (Toki HQ manager)
>
> Presentation or English communication (Toki HQ researcher)
>
> Questioning period - interactive (Toki APG manager)

Together, the survey and usage data suggest that no shared assumptions and expectations emerged among the participants around communicative purpose, the key component of genre.

In addition to this lack of a community-wide interpretive scheme around genre purpose, we also found limited agreement about the form features of the meeting genre as realized in Cyber Meetings. As a two-dimensional MOO, the Palace includes a number of novel functions: multiple rooms through which participants may move, changeable avatars, programmable scripts, and talking balloons.

Explicit expectations were created around the use of one of these functions—avatars. In the Cyber Meetings, every participant used an avatar displaying his or her photograph to allow everyone to see who was participating in the meeting, thus mimicking the opportunity of participants within face-to-face meetings to see each other. At the

beginning of the early phase, a few key people at Toki HQ and Toki US developed a rule that participants should use color photographs of their faces as avatars when they participated in the Cyber Meetings. During the early phase, some of the participants further decided that the avatars should be changed to black and white versions of the same image when participants were inactive. Following these early decisions, every participant in the Cyber Meetings has used a color photograph as his/her primary avatar. However, the rule about switching to black and white format when inactive was never communicated to participants who only joined the Cyber Meetings in the middle or last phases. Thus, the only explicit attempt to set norms and expectations was only partially implemented.

Other features were tried out in the early phase but their use faded out relatively quickly. For example at the 7/9/98 Research Demo Rehearsal Meeting, participants moved among multiple chat rooms within each of which a researcher introduced a technology. To do this, participants changed their avatars to a smaller size and stayed at the edge of the room in order not to disturb the demonstrations (see Figure 1). However, beginning in the middle phase and persisting through the last phase, the participants no longer used multiple rooms, and only a few participants used sound and cartoon-like talking balloons. Thus to the extent that any tacit norms emerged around genre form, they tended towards the lowest common denominator of a single room and text-only chat. Only the explicitly agreed upon norm to use color pictures as avatars persisted through the three phases. In general, then, only limited community-wide interpretive schemes around the purpose and form of Cyber Meetings were evident during the three phases.

Figure 1. A cyber room of the Research Demo Meeting

Importation and adaptation of existing genres

Each of the meetings reflected an individual attempt to import and adapt specific face-to-face meeting genres. For example, the Research Demo Meeting mentioned was based on the research open house. The research center at Toki HQ periodically holds a research open house at which executives walk from one laboratory or conference room to another under the guidance of a senior researcher or manager who explains the technologies on display. The chairman of Toki US was clearly trying to adapt this genre to the Palace technology. In the Cyber Meeting version, each demonstration was held in its own cyber room, and a senior researcher at Toki US guided the avatars through the rooms and used text to describe the technologies.

The research presentation meeting genre was also introduced into the Cyber Meetings. Twice in early 1999, one Japanese researcher gave presentations about his research to Toki US and Toki APG Cyber Meeting participants. In advance of the meeting, the researcher sent his presentation visuals (PowerPoint slides) to participants by e-mail, so they could see the visuals (either on the screen or on paper, but not in a shared space) during the meeting. The researcher tried to deliver his presentation slide by slide, holding questions and answers until after his presentation. This presentation style is very common at Toki HQ, especially when participants in the meeting spanned various hierarchical levels. However, American participants at Toki US tried to import their own meeting style, which involved frequent interaction, clarification, and elaboration. Thus they interrupted the Japanese researcher's presentation frequently to ask questions or make comments, and sometimes deviated from his topics for extended discussions. This disparity in genre expectations across the two cultures caused some discomfort for the Japanese presenter who did not feel that he conveyed his research well. At his second presentation, he attempted to modify his presentation style, as noted in his introductory remarks:

> Today, I have a script for presentation, so I think I might be able to present my slide better than last time.

He had prepared a script of what he wanted to say in the meeting in order to better control the flow, and then proceeded to copy paragraphs from his script and paste them into his Palace window. Though one American researcher at Toki US tried to engage him in a discussion during his presentation, the Japanese researcher ignored most of these interruptions and eventually the American gave up. Figure 2 shows this sequence. Based on the authors' experiences with other global organizations, this sort of clash in genre assumptions and expectations is not unusual in such diverse and distributed settings.

Attempted automation of an existing genre

When people in a community use a new technology, they may expect that it will allow them to automate certain genres. For example, the chairman of Toki US wanted to automate the creation of meeting minutes by using text chat logs in the place of minutes. In his e-mail giving the participants directions concerning the Research Demo Meeting, he asked whether a printout could be generated to

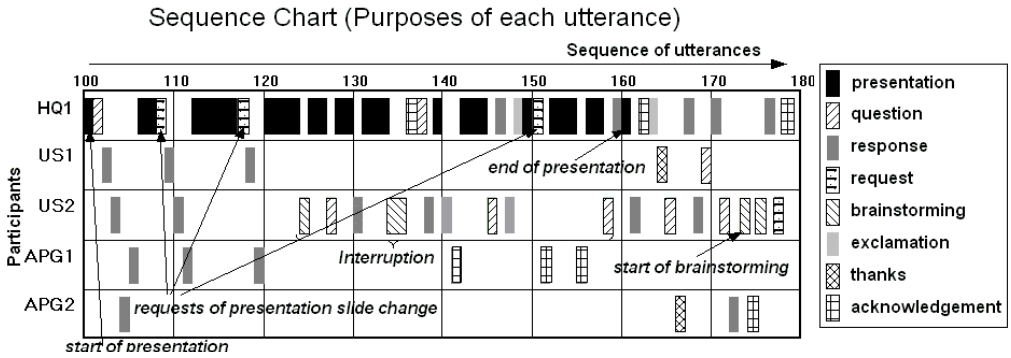

Figure 2. Sequence of 2nd Cyber Meeting among Toki HQ, Toki US and Toki APG

serve as the primary record (i.e., the minutes) for the meeting:

> The dialogues developed at the chatting window will become a record of the multimedia conference. Can we print this record at the end of the conference?

However, this attempt to automate the minutes genre was not widely accepted among participants. For example, the interview with one Japanese manager at Toki HQ revealed why he did not consider the text chat log as an adequate substitute for the minutes genre[1]:

> [While I was participating in a meeting] I read the log to confirm the discussion process, but I rarely read the log after a meeting. However, when I couldn't participate in a meeting which I had planned to join, I read the log. … [In general,] the necessary information in a log is too dispersed to provide a high quality summary. … I must therefore read the whole, and I don't like it.

Thus no community-wide genre norms emerged, genre automation was not widely accepted in the community, and even adaptations of existing genre norms did not become well established.

Technology

View of technology

One of the aspects of people's understanding of technology is what they think it is and what features and functions it has. Before using Palace, most participants, including those who joined after the early phase, either knew nothing about the system or understood it as a fancy chat system. For example, a major participant at Toki US explained in his interview:

> It was so new, I didn't know what to expect. I think Mary and I were the same way. Because it was new, we basically found our own way, and we have no idea if other people use Palace the same way we do.

Participants at Toki HQ and Toki US who joined in the middle or last phase also didn't know the Palace's novel functions, although participants in the early phase had engaged all the functions of the Palace. For example, one of these later participants, a Japanese manager at Toki US, explained his image of Palace before use as "a chat system with photos of participants and talking balloons." He did not know that the Palace could be used to create multiple rooms, to change avatars, and to invoke various sounds. This view is consistent with the actual use of the Palace in the middle and last phases, when participants used only a single room, displayed only their photo avatars, and discussed only in text. This suggests that participants in the early phase did not develop shared assumptions and expectations about the technology, either locally or across sites. Not surprisingly, no shared interpretive schemes about the technology were carried over into the middle and later phases of using Cyber Meetings. As one participant described his impression of the Research Demonstration Meeting in the survey, "The presentation seemed to kill advantages of the Palace."

Rationale for technology

The survey and interview results show that participants at the various sites had multiple reasons for participating in the Cyber Meetings: leaning about collaborative virtual spaces, assessing the technology, and communicating with members in the Toki group. For example, a major participant at Toki US explained the purposes of the Cyber Meetings in an interview:

> The objectives were twofold. … Our project goal was centered around, can we use virtual environments for collaboration between people who are separated. So that was one goal of the meetings, just to test the technology. The second goal was just to get Toki HQ researchers and Toki US researchers discussing their work, so we could be more familiar with what we were doing, if we could identify places where we could help each other.

In contrast, a few participants at Toki HQ saw the purpose of using the technology as one way only: for Toki HQ to help with technology projects at Toki US. Most participants described more than one of the organizational purposes noted above. Moreover, when we examine the data chronologically, we see additional differences across the sites over time. For example, when Toki APG participated in a later meeting in order to learn about the technology, the participants from the early phase at Toki HQ or Toki US

[1] Translated from Japanese by the authors.

had already learned about and evaluated the technology, so reasons for participating were out of sync across the sites.

The participants also had various personal motivations for the Cyber Meetings which reflect their roles in the different sites. For example, the Japanese chairman at Toki US wanted to disseminate and deploy the technology throughout the Toki group. He planned the Research Demo Meeting for a directors' meeting at Toki HQ, suggested the Japanese Cyber Meeting, and directed Toki US participants to introduce the technology to sites within Toki APG. In another example, a researcher at Toki HQ wanted to use the data from the chat text logs for his research, as he explained in his interview:

> I expect some connection with my research, because I think chat data could be a new type of data source for my research…

And as we saw above, another researcher at Toki HQ was interested in using Cyber Meetings to disseminate his research to participants at the various sites, and to establish social connections with members there.

Examining these various reasons for the technology, both across sites, and across time, it is apparent that the participants never developed a common and compelling communicative reason for using the technology on a regular basis.

Use of technology

In their actual use of the Cyber Meetings, participants encountered many obstacles as they attempted to use the real-time chat technology, including interwoven threads and keyboard typing.

Threads of conversation became interwoven because contributors composed their sentences offline and then submitted them to the discussion. Because these contributions were not coordinated, there were delays between local composition and appearance within the Palace. As a result, participants became confused when a new topical thread began before a delayed response, or when someone interjected into a sentence with another or a previous thread. In order to solve or mitigate the problem, some of the participants developed such techniques as writing short sentences, using ellipses when they wanted to continue a sentence, and inserting the recipient at the beginning of a sentence. The participants also developed personal conventions such as waiting patiently and performing other tasks (e.g., reading e-mail) during the wait, and reading through the log to get back into the Cyber Meeting conversation.

At the meeting in which members of Toki US introduced the Palace to members at Toki APG, some of the latter participants raised this issue, and the Toki US participants answered as follows[2]:

> APG1: This software is interesting but seems to require 100% attention. So if I take my eyes off for a while, events took place and I'm left behind. I found the log but that's hard to track.
> US1: (But then, we do a lot of multimedia.)
> US2: We originally created this space to introduce our colleagues at Toki HQ to our facility.
> US2: You can open up a log window that captures the discussion.
> US1: Actually, I use the log a lot when I use this system.
> US2: Open the "Options" menu (at the top), then select "Log Window" (towards the bottom of the menu).
> US1: You can make the log window larger, if it is not giving you enough context.
> ...
> US3: The log is an important record of the meeting
> US1: :(I have been known to run for a Coke and then scroll through the log to catch up on the conversation!)
> US1: Going back to the question of delay . . .
> US2: It is also convenient if you get interrupted by someone who stops by your office, not realizing you are in an on-line meeting!
> US1: In our meetings with Toki HQ researchers in Japan …
> US1: There is usually a bit of delay allowing for the time it takes them to go between Japanese and English.
> …
> US1: So we are used to delays in the conversations.

Participants who type slowly encountered the above problem more frequently, because it took longer for them to compose a sentence. At the Japanese Cyber Meeting, one Japanese participant suggested that they might compose important sentences in advance of a meeting, and open a text editor during a meeting, copying and pasting these sentences into the conversation at suitable moments. As described above, one researcher at Toki HQ adopted this idea and used it in his next Cyber Meeting, at which he presented his research projects to Toki US and Toki APG.

Though many of the participants who experienced these difficulties attempted to develop techniques and personal behaviors to cope with the typing barrier, some participants felt that this aspect of the technology was insurmountable. This is one of the reasons cited in the survey for why the participants in the Toki group have not held any Cyber Meetings since September 1999:

> There is definitely a problem with anyone who does not like typing. I have never had a problem with typing, so my participation has always been pretty energetic. … It seems to be the more senior people who are not comfortable with the typing interface and, as a result, have not really endorsed the activity. As a result, the system seems to have fallen into disuse.

As described in the previous subsection, the unique functions of the Palace as a two-dimensional MOO fell into disuse and most participants used only the text chat function from the beginning of the middle phase onward.

Culture

Cultural differences across the sites and participant identities were clearly important in the Cyber Meetings. As the authors are not very familiar with the national and

[2] We have disguised participant names, and US1 means the first participant at Toki US to speak in this meeting.

corporate cultures of Toki APG, we focus on the cultural issues associated with the American and Japanese sites.

Language barrier

The coding results show that the average number of utterances of Japanese participants was less than that of Americans at every meeting. The survey and interview results demonstrate clearly that every Japanese participant felt language barriers in the Cyber Meetings, to a lesser or greater extent. For example, a researcher at Toki HQ described his first impression of a Cyber Meeting:

> Before using the Cyber Meetings, I hesitated and was on guard, because it seemed very hard to do everything in English, etc. But, once I participated, ... what I expected happened. I could not follow the pace of participants at Toki US. They asked many questions in real time, and I delayed while I answered one by one in a chat space. It was just what I had expected, and I felt that it really happened.

Another Japanese participant pointed out that in order to participate effectively, they needed to change their thinking patterns to be the same as those of American people.

> We need to discuss in English style. We need to type yes or no, …, and type to whom and then why. … Unless participants obey this style thoroughly, they frequently become confused..

However, both Japanese and American participants recognized that for the Japanese, text communication in English is easier than oral communication, because the interaction rate of text communication is slower than that of oral communication. Thus, the survey results indicate that for many situations the Japanese participants preferred e-mail communication to the Cyber Meetings, because they could deliberate over the language when they communicate by e-mail (see [5] for a similar finding).

Cultural differences in interactivity

In face-to-face meetings, when the extent of the job hierarchy among participants is wide or a meeting involves participants outside the community, the Japanese tend to adopt a formal and controlled meeting style. Americans, on the other hand, put less emphasis on the configuration of participants and interact extensively, as they do in meetings with local colleagues. Similar cultural differences appear in the use of Palace. Although the participants in the Japanese Cyber Meeting agreed on the necessity of a meeting facilitator, no explicitly designated meeting facilitators were used in the Cyber Meetings. One of the reasons may have been that the informal characteristics of the Palace made it difficult for the participants to choose a facilitator. Another reason may be that a major participant at Toki US, who could have been a facilitator because he was the most familiar with the Cyber Meetings and did not have barriers such as typing and language, instead actively voiced his opinions. At the last meeting, where there was only one American participant, a Japanese manager at Toki HQ controlled the meeting.

At the Japanese Cyber Meeting in which the (Japanese) chairman of Toki US, managers and researchers participated, they talked an equal amount of the time and discussed issues very frankly. If such a meeting had been held face-to-face, they would not have done so. A Japanese manager explained the informality of the Palace in his interview:

> One advantage of the Palace, as commonly noted, is that there are many utterances independent of job position and authority due to depersonalization, and I realize there are merits derived from this point. ... We can discuss frankly. To take another perspective, it is difficult to navigate the discussion. So, it has both good points and bad points.

Thus some of the cultural differences in interactivity present in face-to-face meetings might have been adapted in the Cyber Meetings over time. Nevertheless, they clearly remained salient in the Cyber Meetings analyzed, as shown particularly clearly in the discussion in the genre subsection (above) of the two presentations by the Japanese researcher.

Time difference

While popular rhetoric proclaims that the Internet transcends time as well as space [3], the time difference among the sites was a clear source of difference and difficulty. The Cyber Meetings were all held in the morning at Toki HQ and Toki APG, and in the evening at Toki US because of time differences. This timing made it hard for participants to share a common context, because participants at Toki HQ and Toki APS had just started their work days while for participants at Toki US the meeting was the last piece of work in a day. Thus participants at the different sites had different moods around work. For example, at the start of a meeting, one participant said "Good morning" as a greeting while others said "Good afternoon," and participants at Toki HQ and Toki APG said or heard "Good night" from participants at Toki US at the end of a meeting when their clocks showed it to be the morning.

Moreover, the United States adopts Daylight Savings Time in the summer but since Japan does not, the Japanese forget about the time change. This time change caused problems. In a Cyber Meeting, a major participant at Toki HQ did not know about the time change of the United States, and participants at Toki HQ and Toki US joined at different time as the log shows:

> US1: hello, anyone there?
> ...
> HQ3: Yeh, we are all here!!
> US1: We are not scheduled to meet for another hour, correct?
> US1: If you prefer, I could see if US2 and US3 are available now.
> US1: It is only 15:40 here now. We thought we were meeting at 16:30.
> HQ1: I think the time is correct.
> US1: Are you just here testing now, or would you like to begin soon?
> HQ1: We would like to start now.

US1: Okay, let me try to find US2 and US3.
HQ3: Thank you, US1.
HQ3: Did we make mistake about the MTG time, HQ1-san?
HQ1: I am sorry. I think I forgot about summer time.
HQ3: Right!! Summer time is over.
HQ3: When I was in US, I made mistakes several times.
HQ1: I am very sorry.
US1: I can't find US2 or US3.
HQ3: No problem!! Don't mind.
HQ1: US1, I made a mistake.
US1: That's okay. I know it is confusing with the time changes.

Temporal orientation

In addition to the differences in time of day across the sites, there were also differences in temporal orientation by role (manager vs. researcher). Every Japanese manager at Toki HQ and Toki US wants to use the Cyber Meetings as a cost-saving communication method for quick decision-makings among geographically dispersed organizations. For example, a Japanese manager at Toki US explained in his interview:

> Communication via email, especially with Toki HQ, takes a long time so the synchronous Cyber Meeting is good at achieving objectives quickly through frequent exchanges within a few seconds, all taking place within an hour or one and a half hours.

However, researchers do not have such efficiency motivations but want to exchange research information with outside people or to create social networks. Thus, there is a difference of temporal orientation between managers and researchers.

Interactions across categories

For the purposes of the above discussion, we have analytically distinguished among interpretive schemes around genre, technology, and culture. As already indicated above, however, there are clearly interactions and overlap of participants' assumptions and expectations around these three areas.

For example, one of the reasons why the more interactive American presentation (genre) is not typically enacted in the Toki group's Cyber Meetings is that the Japanese cannot interact as rapidly as native English speakers; they require time to compose texts in the English language (culture) and to use a keyboard (technology).

CONCLUSION

In this study, we examine a number of assumptions and expectations about genre, technology, and culture of the participants of the Cyber Meetings. In each of these three areas, we found differences in interpretive schemes across sites, nationalities, languages, and roles, as well as over time. These differences help explain the difficulties in use of Cyber Meetings, the limited development of persistent norms, and the fall into disuse of the Palace technology at Toki group after the third phase. The different expectations and assumptions of the participants, together with the absence of compelling motivations among the participants and sites, made it difficult for the new technology to become an established communication medium in this global organization.

We turn now to some implications for practice emerging from these findings. In an earlier study we noted the useful role of technology-use mediation in facilitating the adoption and use of groupware in organizations [19, 33]. This mediation aided in the development of effective genre use in a new electronic technology. Based on this study, we propose here that mediation of cultural issues -- from nationality to temporal orientation, language to professional status -- may be especially important in global organizations. People who have knowledge about the various cultures as well as the technology and communication genres may intervene among various participants, helping to avoid cultural misunderstandings and facilitating productive interactions.

While such mediation should be able to reduce cultural barriers likely to be encountered in global organizations, it cannot eliminate the barriers of language and typing capability, but over time these may gradually be reduced as more people become familiar with the Internet at a younger age and develop skills in navigating different cultural, linguistic, and technological environments.

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