Chapter 4

Technologies for Conducting an Online Ethnography of Communication:
The Case of Eloqi

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ABSTRACT

In this chapter, the author describes the technologies she employed while conducting an Ethnography of Communication on Eloqi (pseudonym), a for-profit start-up company that built and operated a proprietary Web-based, voice-enabled platform connecting English language learners in China with trainers in the United States. While Eloqi existed, its unique platform not only connected trainers and students for short one-to-one English conversation lessons but also brought together the company admins, trainers, and students in a virtual community. This chapter describes the technologies that the author used to carry out the qualitative study from start to finish, including the steps of online participant observations, online and offline interviews, qualitative coding, and qualitative data analysis. Because the author studied a virtual community, technologies played a critical role in how she collected, managed, and analyzed the dataset, which was completely electronic. The chapter concludes with tips and advice for fellow researchers using technologies to support qualitative studies of communication, whether online or offline.

INTRODUCTION

Imagine a private language school specializing in EFL (English as a Foreign Language) training. The students attending this school want to use their English language skills to change their lives, whether that means securing a place at a good university, getting a competitive job, or moving forward on their chosen career paths. The trainers want to gain instructional skills and add new experience to their portfolios, while also developing their professional network. The school founders and administrators want to attract sufficient students to turn a healthy profit, while also contributing to the educational field in innovative ways. Such was the case with Eloqi (pseudonym),

an EFL school that I studied. What stood Eloqi apart was the fact that it was an online environment, and its different members (admins, trainers, students) never met one another face-to-face. The Eloqi founders built a proprietary web-based, voice-enabled platform to connect students and trainers for one-to-one conversation lessons. Eloqi's only office was located in Beijing, its students were spread all over China, and the trainers were located across the continental United States. Eloqi was a *virtual community*, i.e. a group of people who are relationally involved with one another and share common (to the group) norms, rules, and practices, and who assemble and interact with one another online. (Komito, 1998; Kozinets, 2009; Rheingold, 1993) I engaged in an ethnographic study of Eloqi to learn about that community's *speech code*, or code of communicative conduct, i.e. their norms, premises, and rules for engaging in speech with one another (Philipsen, 1997; Philipsen, Coutu, & Covarrubias, 2005).

Eloqi's Chief Technology Officer, an acquaintance of mine, was interested in and supportive of my research goals. He and his business partner had recently graduated from Stanford University and were excited to build up their new company. Reasoning that my research would help them better understand their own developing company culture as well as their trainers and students, Eloqi invited me to join their team as a researcher-trainer. In my researcher-trainer role I was allowed to teach lessons, attend weekly trainer meetings, socialize with the other trainers, participate in Eloqi's trainer discussion forums, and access the company's growing archive of trainer-student lesson recordings – all online. I actively studied the Eloqi community for 10 months using qualitative methods that included online participation observation and interviews. By the end of my data collection phase I had amassed a sizable assortment of electronic data, including lesson recordings, interviews, fieldnotes, screenshots, and more.

In this chapter I will describe the technologies that I used to collect, manage, and analyze my qualitative data. I will cover the technological configurations that I assembled to support my online participant observations and hold my online and offline interviews. I will describe how I organized and managed my electronic dataset. Finally, I will explain the tools that I used for the data analysis phase, including the qualitative data analysis software that I used for coding, analysis, and reporting. My chapter will conclude with tips and advice for other researchers who are using technologies to support qualitative studies of communication, whether online or offline.

BACKGROUND

My aim in this research project was to identify the Eloqi community's system of rules, norms, and premises pertaining to communicative conduct, i.e. their speech code (Philipsen, 1975, 1992, 1997; Philipsen et al., 2005). For this purpose I employed the Ethnography of Communication (Hymes, 1962, 1972, 1977; Philipsen & Coutu, 2005). The Ethnography of Communication (EC) is a qualitative theoretical/methodological framework distinct from, but closely related to, ethnography. Ethnography, like EC, is geared towards studying human behavior and culture, and is intended to "[reveal that culture] through discerning patterns of socially shared behavior" (Wolcott, 1999, p. 67). What makes EC different is its unique combination of "ethnography, the description and analysis of culture, with linguistics, the description and analysis of language" to produce contextualized analyses of the "relationships between language and culture" (Keating, 2001, p. 285). The EC approach, particularly in combination with theoretical/methodological frameworks like Speech Codes Theory, generates nuanced reports on how members of a given community speak with one another, the rules and values guiding that speech, and the concepts of personhood and society linked with it (Philipsen & Coutu, 2005; Philipsen et al., 2005). The EC

approach provides tools for contextualizing such reports with detailed information on what happens in, around, and through speech; it does not separate communication from the context in which it occurs (Philipsen & Coutu, 2005).

Many researchers have examined technology-mediated communication and the multifaceted ways in which people live, work, and socialize in online environments (Baym, 2006; Cassell & Tversky, 2005; Danet, Rudenberg-Wright, & Rosenbaum-Tamari, 1997; Donath, 1999; Miller & Slater, 2001; O'Brien, 1999; Sterne, 1999; Stone, 1995; Turkle, 1995) and there is substantial precedence for using ethnography in this work (Bennett, 2012; Boczkowski, 1999; Boellstorff, 2008; Boellstorff, Nardi, Pearce, & Taylor, 2012; Goodfellow & Lamy, 2009; Hart, 2011; Hine, 2000, 2008; Keating & Mirus, 2003; Kendall, 2002; Kozinets, 2009; Mann & Stewart, 2000; Markham, 1998; Miller & Slater, 2001; O'Connor, Madge, Shaw, & Wellens, 2008; Polson, 2013; Salmons, 2011). There is also a growing interest among communication scholars in using EC's theoretical/methodological approach to study technology-mediated communicative conduct, recently evidenced by the "Talking technology: New connections in the Ethnography of Communication and technology" symposium at the 2013 National Communication Association convention. EC type studies may focus on a number of communication phenomena in an almost unlimited number of technology-mediated spaces. For example, they may be in-depth reports on communication in one particular virtual community (Manning, 2008) or cross-cultural studies of comparable online communities (Hanna & De Nooy, 2004, 2009) They might even be studies of people in offline or hybrid (online plus offline) communities whose linguistic and sociolinguistic practices are impacted by technologies (Keating & Mirus, 2003).

What all of these qualitative studies have in common is that they address "the relationship between symbolic practices and social struc-

ture" (Lindlof & Taylor, 2002, p. 44). That is, the researchers doing this work are ultimately interested in discovering and explaining the connection between communication (in this case, technology-mediated communication) and culture. To determine this connection, these researchers engage in "systematic, comparative knowledge of phenomena and systems" and have the training and ability to make inferences, ask questions, and utilize the data to make sense of situated communication, with no pre-determined answers in mind (Hymes, 1977, p. 170). The situated, highly contextualized, richly descriptive ethnographic approach of EC is a natural fit for understanding online communities and the social interactions that members engage in.

To gather and analyze the contextualized, descriptive qualitative data required for an ethnographic study, multiple methods are very helpful (Brewer & Hunter, 1989). This is particularly true in international, intercultural, and cross-cultural projects where one's cultural assumptions can hinder analysis of the findings and extra measures may be needed to fully test and validate interpretations (Johnson & Tuttle, 1989). Multiple methods help investigators "collect rich, descriptive, contextually situated data in order to seek understanding of human experience or relationships within a system or culture" (Mann & Stewart, 2000, pp. 2-3) as well as "examine different levels of the same situation or to focus on different aspects of the same phenomenon" (Mann & Stewart, 2000, p. 95). The usefulness of multiple methods naturally applies to offline, online and hybrid research sites where fieldwork will be carried out.

Like other ethnographers, EC researchers almost always engage in some type of fieldwork (Keating, 2001; Saville-Troike, 1982) and/or close textual analysis (Coutu, 2000; Edgerly, 2011) to examine naturally occurring speech *in situ*. Fieldwork is critical to EC research because it creates opportunity to examine how contextual factors such as the features of the settings, the relationships between participants, the goals of

the speech event, or norms and rules pertaining to the event, are implicated in or constitutive of the communication taking place. For EC researchers immersion in a field site is a critical means of collecting qualitative data on the community and communication in question, and typically generates a substantial, rich, and complex data set comprised of fieldnotes on observations and/or participant observations; interview transcripts; audiovisual recordings (Keating & Mirus, 2003); user-generated digital text (Manning, 2008); images and screenshots; or any combination of these (Gordon, Holland, & Lahelma, 2001; Keating, 2001; Saville-Troike, 1982; Smith, 2001; Wellin & Fine, 2001; Wolcott, 1999).

Considering the size and complexity of ethnographic – especially EC – data sets, it is very helpful to have technologies on hand to support the process of collecting, processing, and analyzing the data. Luckily, there are powerful yet simple and inexpensive tools that serve exactly this purpose, some of which I will describe in this chapter.

A NOTE ON RESEARCH ETHICS FOR INTERNET STUDIES

Studies of virtual communities require careful consideration and planning in regards to research ethics, data collection, and reporting procedures. To inform my decision-making process I used the recommendations from AoIR, the Association of Internet Researchers (Markham & Buchanan, 2012). I approached Eloqi as a private organization and its community as a private online environment because Eloqi's spaces (both physical and virtual) were only accessible to its members. Eloqi considered all interactions across its platform to be proprietary information and recorded them for quality control. The trainers and students had access to all of their own lesson recordings, and

trainers had access to additional recordings of group admin-trainer meetings. For the purposes of my study, Eloqi granted me special access to the trainer-student lesson archive and invited me to communicate with admins whenever I needed to. The Eloqi trainer community was informed that I was studying communication in the organization, and that I held dual researcher/trainer roles. I obtained informed consent for all interviews with Eloqi community members. To further protect the privacy of the community I applied pseudonyms to the company itself and all of its members. Finally, I removed all identifying information from the data so that members would be unidentifiable not only to my readers but also to one another. The University of Washington Human Subjects Division reviewed and approved my research proposal before I began data collection.

TECHNOLOGIES FOR DATA COLLECTION

Because I was approaching my study of Eloqi using the theoretical/methodological lens of EC, I was operating under the belief that the examination of speech requires the examination of socio-cultural structure as well as "pragmatic meaning" (Hymes, 1962, p. 104), i.e. meaning in *practice*, or everyday, real-life meanings attached to speech. Accounts of pragmatic meaning must necessarily look at the larger situations (of activity, of human relationships, of shared histories and experiences) in which speaking takes place. Codes of communicative conduct are not necessarily "visible", comprehensible, or verifiable in only a turn of conversation, or out of context of the interaction in which they are employed. Indeed, an ethnographic analysis of a community's speech codes is very similar to a traditional ethnography of a culture in that

the study of culture is formulated out of the patterned behavior of individuals interacting with other individuals…. The ethnographer looks at such instances in order to discern recurring themes, behavior suggestive of underlying templates for action (Wolcott, 1999, p. 260).

To this end, I engaged in a long-term ethnographic study of Eloqi's community of practice. This allowed me to collect examples of real communication between Eloqi's members (admins, trainers and students) and to see that real communication in its larger context. The fact that Eloqi was mostly an online community meant that using certain technology-based data collection methods was a natural and practical choice. Four technology-enabled and/or –enhanced data collection methods that I employed were sustained online participant observation, web-based interviews with Eloqi trainers, in-person interviews with Eloqi students, and procuring digital audio recordings of trainer-student lessons from the web-based Eloqi archives.

Technology-Supported Online Participant Observation

When doing participant observation a researcher enters the field site to both participate in and observe social interactions, thus learning by doing. This process enables the researcher to make better sense of situated meanings, learning more deeply about the experience of the research participants themselves (Frey, Botan, & Kreps, 2000; Saville-Troike, 1982; Wolcott, 1999). Regardless of what technologies or means of communication the informants are using, the corpus for an EC study must provide information on speaking *in context* (Hymes, 1962, 1972, 1977; Lindlof & Taylor, 2002; McDermott, Gospodinoff, & Aron, 1978). That is, the corpus should contain not merely transcripts of speech, but data on the place, time, and circumstances in which that speech took place, and its cultural, social, and

historical aspects. "[To] participate is to know enough about the rules for interaction and movement so that movement and interaction with and within this space is possible" (Markham, 1998, pp. 23-24). My online participant observation at Eloqi, which I conducted for 10 months, allowed me to learn the appropriate rules for interaction in this virtual space.

The *participation* component of my technology-supported ethnography was intensive, demanding, and time-consuming. As an Eloqi trainer I attended weekly trainer conference calls and worked weekly shifts. During the conferences calls and shifts I actively followed the talk going on in the trainer chat room, and I joined in synchronous and asynchronous discussions with other trainers by posting questions and comments. As per my trainer duties I took regular live, one-to-one calls from Eloqi students, during which I used the company's lesson plans and materials to help the students with their English conversation skills. I also stayed up to date on the Eloqi's teaching modules, completing new ones as they were released so that I could qualify to teach the lessons associated with them. At the same time that I was engaging in these activities, I was also collecting data (notes, conversation transcripts, screenshots) meaning that I was always multitasking, collecting and processing information while also engaging in the routine tasks that went along with my role as a trainer.

A typical participant observation session for me involved two levels of technology-based concerted work. The first level was to fulfill my duties as a member of the Eloqi trainer team. In this capacity, I took part in the routine activities prescribed by my role. Once I had committed to a shift, I made arrangements to be in a quiet place with a stable Internet connection for the duration of the shift. About fifteen minutes before the start of my shift I would sit down at my laptop, switch it on, and open up a virtual machine using VMWare. The Eloqi platform ran on Windows but not on MacOSX. Since I use a Mac, I needed to install

a virtual PC – essentially a computer inside a computer – on my laptop. Once inside the virtual machine I used a web browser to navigate to the Eloqi trainer portal, where I logged in using my unique username and password. Inside the portal I navigated to and entered the Eloqi chat room. Inside the chat room I could see and exchange instant messages with the supervisors on duty as well as all the other trainers working the shift. In addition to being inside the chat room, I also initiated a version of the company's special software, called the Trainer Client (TC), which I kept on my virtual desktop. The TC was the platform for the lessons between the Eloqi trainers and the students and served as the virtual classroom where the trainers and students met one another. Finally, I made sure to have word processing software (Microsoft Word) open and running for the purpose of jotting down notes and impressions. From inside the Eloqi virtual space I waited for student calls to come in. In the meantime, I fol-

lowed and participated in the discussions going on in the trainer chat room.

Whenever a student call came in to me I'd accept it and proceed with the call using the lesson screen, which initiated automatically and provided a trainer script correlating with the particular lesson that the student had chosen. Like all the other trainers I taught each lesson by following the prompts and guidelines that appeared on my screen.

At the conclusion of the lesson I wrote up the required qualitative feedback for the student, closed the lesson window and returned my attention to the chat room. Finally, at the end of my shift I bade my fellow trainers goodbye, logged out of the chat room and the trainer portal and closed all related windows.

The second level of work was collecting data simultaneous to engaging in my trainer work routine. Although I could have recorded all of the activities on my laptop by using third-party
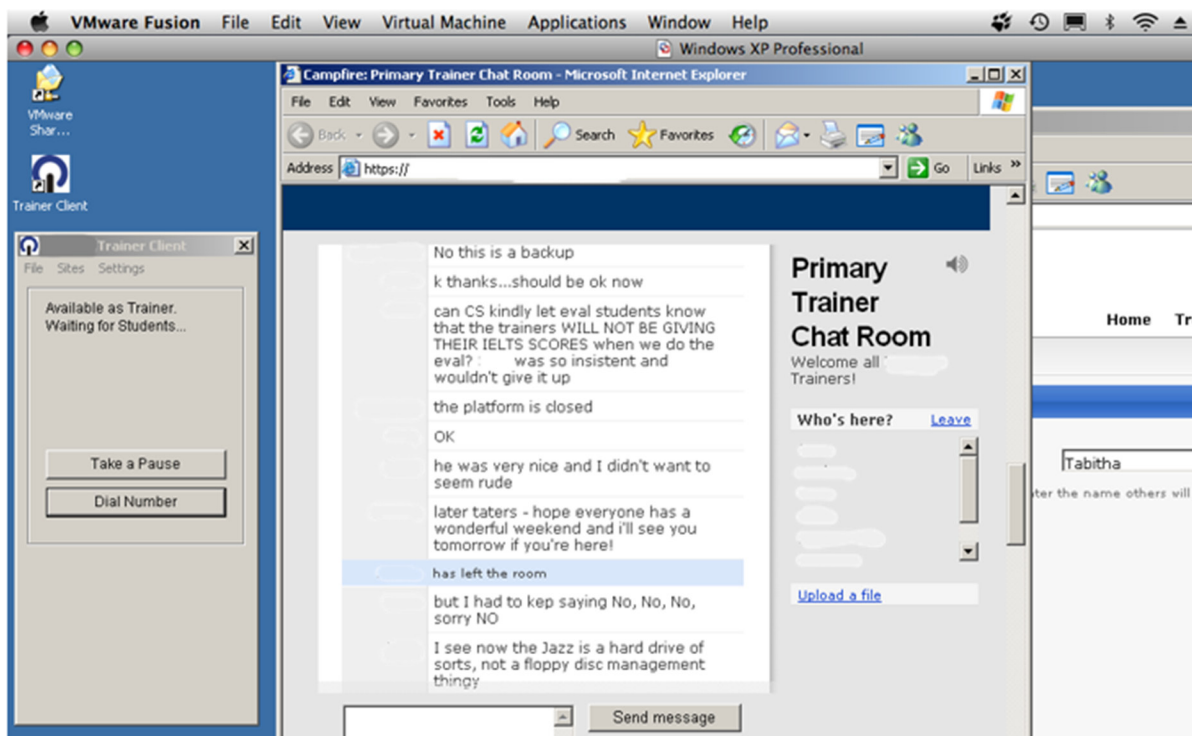
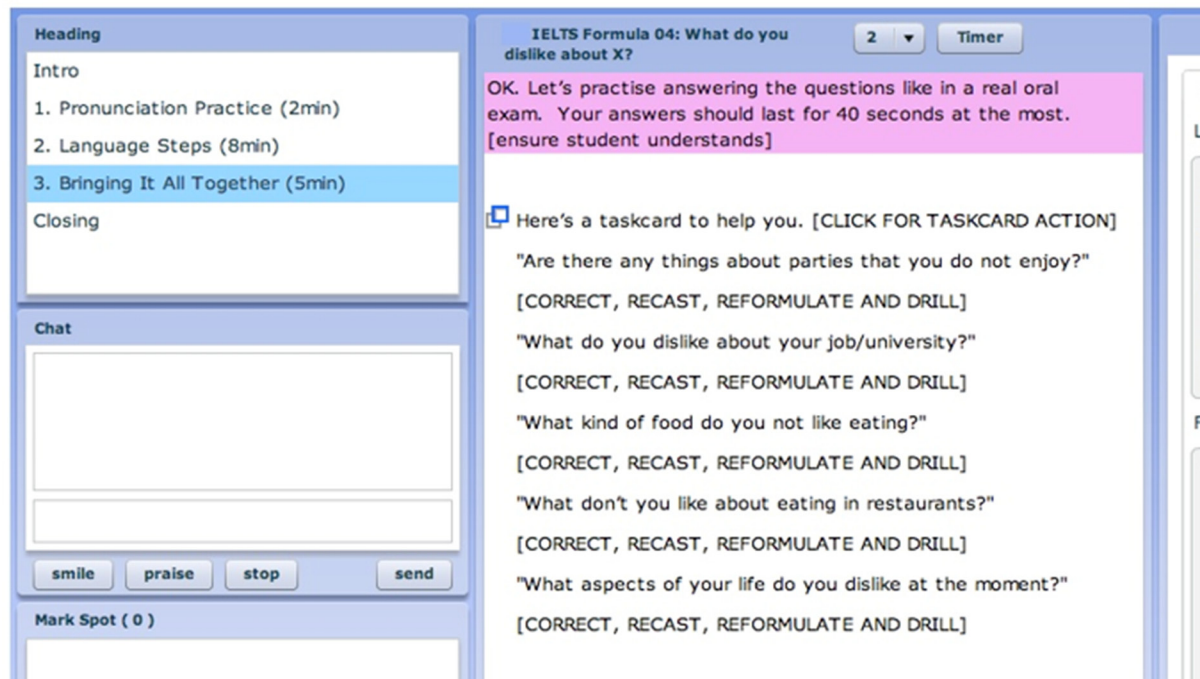*Figure 1. Desktop with Eloqi TC and chat room*

Figure 2. Eloqi lesson screen

screencasting software, I was on a limited research budget and so opted to use a combination of two tools that I already had: word-processing software and screenshot capture shortcuts. It wasn't necessary for me to audio-record my lessons with the students because Eloqi did this as a matter of course with all of the trainers, and I had access to the lessons through the Eloqi cloud-based archive (more on this later).

The word-processing and screenshot tools were very easy to use. For each of my participant observation sessions I created a new blank document, which I continually kept open on my screen beside my other open windows. Into this blank document I typed notes and jottings while I was working, and pasted text from other open windows (for example, conversational turns from the trainer chat room). During my work sessions I didn't bother to format or edit this document in any way; rather, I concentrated on simply getting information into it. At the same time, I periodically created screenshots of the activities in the open

windows by using my operating system's built-in key combination. By holding down the required keys on the keyboard I created snapshots of my screen, a window, or an area that I selected. The snapshots were instantly saved as images (png files) on my desktop.

After the end of each shift I followed the guidelines of Emerson, Fretz and Shaw (1995) to expand the jottings and notes saved in the Word document into full fieldnotes. Doing this while my memory was still fresh allowed me to recall and document the maximum amount of detail and description. When it seemed important, I also embedded copies of relevant screenshots into my fieldnotes as reference. Otherwise, I simply renamed each screenshot according to the conventions I had adopted for this project (more on this later) and filed them away.

The tools that I used to document my online participant observation in this phase of the project were simple and easy to use. The challenge was actually in doing simultaneous technology-based

participation and data collection. A normal trainer shift was by default an intense experience because it entailed managing multiple time-sensitive tasks in different windows. Adding on the extra component of data collection made it even more demanding. The advantage was that all activity happened on a virtual desktop enabled with effective tools for quickly and effectively capturing information. The fact that the information captured was already in electronic format was another time-saver, as I will describe later in this chapter.

Technologies for Procuring Audio Recordings

For this project it was important to procure and/or generate digital audio recordings whenever possible. Although I took copious notes during speech events, I could never accurately jot down all of what was said; even on my best days I probably lost thirty percent or more of utterances when relying only on my own note taking. What's more, my notes alone could not capture paralinguistic cues such as interviewees' volume, pitch, inflection, intensity, speed, or silence. Because such nonverbal cues can convey important meaning, it was desirable to have accurate recordings. Finally, recordings allow for the creation of transcripts, an important addition to a qualitative dataset. Since I was interacting with my research participants online and offline, and both in-person and remotely, I needed a variety of recording solutions. Ultimately I relied on three different technology-based configurations for collecting audio recordings: (1) Skype-based interviews with third-party recording software for remote interviews, (2) a portable hardware set-up for in-person interviews, and (3) downloads from the company's cloud-based archive of trainer-student lesson recordings. A description of each follows below.

Skype-Based Interviews and Third Party Recording Software

All of the Eloqi trainers worked directly from home and were spread across the continental United States. Given budgetary and time restrictions, it was not practical or even possible for me to meet the trainers in person. Luckily, because of the nature of their work with Eloqi, all of the trainers were highly skilled with web-based communication, so using an online meeting platform to conduct the interviews with them was a natural choice. Specifically, I selected Skype as the primary medium of communication.

Skype is a communication service that utilizes Voice over Internet Protocol (VoIP). VoIP is essentially a means of enabling a telephone-type experience over the Internet, whereby an Internet-enabled device (laptop, smart phone, tablet) is the phone and the Internet connection is the line (Bertolucci, 2005). When using Skype from computer-to-computer, there are no restrictions on where in the world users can be located. Skype's good sound quality is one of the features that makes it so popular (Max & Ray, 2006). Using Skype is free of charge when users are connecting computer-to-computer over the Internet. The basic software can quickly and easily downloaded from the Skype website. An additional benefit of Skype is that it includes an instant messaging (IM) function with which callers can text one other before, during, or after the voice call. Skype also supports live video (users must have a functional webcam) and file transfer (callers can send files to each other using the platform).

To use Skype computer-to-computer, each party needs to have a device on which the software is loaded (a laptop, tablet, smart phone, etc.) as well as a fast Internet connection. For most of my interviewees this wasn't a problem, since

they either already had Skype installed, or were open to downloading it and using it with me. In these cases, we used the free version of Skype to connect computer-to-computer.

Some of my interviewees, however, either wanted me to call them on their phones or preferred to call me themselves. Neither of these scenarios posed a problem using Skype. To accommodate them, I subscribed to two of Skype's additional, for-cost services. First, I purchased a subscription to Skype's "Unlimited US and Canada" service, which lets you place an unlimited number of calls to landlines in the United States and Canada. With this service I could log in to Skype, select the "call phones" function, and easily call the phone number that my interviewees had given me. For those interviewees who wanted to call me themselves, I set up an online Skype number. With an online Skype number you essentially rent a phone number from Skype. The phone number can be associated with one of 25 countries. I rented a US American number, meaning that the international code of my number was "1" and I had a three-digit area code, just like any phone number in the United States. To receive calls placed to my online Skype number, I needed to have a device loaded with Skype switched on (in this case, my laptop), and I needed to be connected to the Internet with the Skype software running. If any of these conditions were not met and someone attempted to call my online number, they would not have been able to connect with me. Instead, their call would have gone to my Skype voice mail account, which came with the service.

Overall Skype proved to be a good match for interviewing the Eloqi trainers. A challenge of using technology-mediated communication tools can be the degree of computer literacy that you and your participants have (Mann & Stewart, 2000). However, since members of Eloqi's trainer pool were accustomed to using Internet-based communication tools to connect with colleagues and students, it was appropriate to conduct the interviews through similar channels. Many of the trainers were already veteran Skype users, and those who were not were already familiar with Eloqi's similar platform, which combined VoIP with interactive text. Because of this, downloading and using Skype was a simple matter for them. For those interviewees who either wanted me to call them or wanted to call me themselves, Skype became an invisible (to them) platform supporting our calls. Skype also offered flexibility in choosing our physical locations for the interviews, provided we all had a device and an Internet connection (when we used Skype for computer-to-computer calls) or at least a phone line (when we used Skype-to-phone or phone-to-Skype calls).

Using Skype was not problem-free. During peak hours (typically the late afternoons and early evenings, after people across the United States had finished work) the sound quality degraded. Skype's IM feature does allow users to exchange text messages with one another instantaneously, and these text messages are automatically recorded on a users' profile, allowing you to go back and read them (or analyze them) after the fact. However, since relying on text messages was not ideal for my purposes, when Skype's sound quality became too poor to continue I either re-established the connection using Skype-to-phone (which could also have poor sound quality) or rescheduled the interview altogether.

Despite the occasional traffic and sound quality issues, Skype proved to be a convenient and cost-effective means of conducting the trainer interviews. The greatest advantage to using Skype was that I could easily record the interviews using third-party software. For this project the additional software that I chose was Audio Hijack Pro, a program that can record any sound file that is being played on or generated by the computer on which it is loaded. There are numerous software choices for recording Skype calls, but I opted for Audio Hijack Pro because it was reasonably priced (USD $32) and, most importantly, was Mac compatible. Once Audio Hijack Pro was installed on my laptop, I simply opened it up and selected

the application that I wanted to record from (in this case, Skype). During interviews I could click "record" and "pause" as with a physical recording device. At the end of each interview, the recording was saved to my hard drive as an MP3 file, which I could then play back on my laptop using VLC media player, and transcribe using Word.

Portable Hardware for In-Person Interviews

Through support from the University of Washington Graduate School and the University of Washington Department of Communication I was able to fund a trip to Beijing, during which time I conducted individual face-to-face interviews with Eloqi students. Prior to the trip Eloqi helped me in creating a suitable interviewee pool, ensuring that all of the candidates were located in Beijing and that they felt comfortable holding the interviews in English. Using email and phone calls to make arrangements, the students and I met in public places all around the city in locations convenient to them. As I quickly learned, Beijing is enormous – the city's total area is nearly 7,000 square miles – and so traveling to different parts of the city for interviews was a serious undertaking.

Given that I was carrying my own equipment and using public transportation to cover a very large territory, it was important to have portable, lightweight equipment for recording the student interviews. A smartphone or tablet with sophisticated all-in-one functionalities (audio- and video-recording, camera, note-taking) would have been perfect; at the time, however, I did not have such a device and couldn't have afforded to purchase one. Instead, I used what I had: a music player (iPod Touch) loaded with free built-in voice recording software (Apple's Voice Memo) fitted out with an inexpensive external microphone (MityMic). On the plus side, the music player was small, very portable, and had good battery life. The software was easy to use, and the digital recordings were

easily transferred to my laptop. The external microphone was small but powerful and picked up voices effectively, even with the inevitable background noise of our meeting places. The downside to this set-up was that the music player had only one audio jack, so I could either plug in the microphone *or* my earbuds, but not both. This meant that I couldn't do sound checks during the interviews. Instead, I had to record a sample, stop the recording, pull out the microphone, plug in my earbuds, play back the recording to check its quality, and then reinitiate the interview.

Downloading from the Eloqi Cloud-Based Archive

Eloqi routinely recorded each trainer-student lesson for quality assurance purposes. At the conclusion of each lesson, the platform generated an audio recording (about 2.7 megabytes each) which was instantly stored as a compressed digital audio (mpg) file in an archive on the company server. Eloqi granted me password-protected access to the archive of recordings, of which there were tens of thousands. I used the archive's search features and my selection criteria to sort through the lessons. Ultimately I downloaded 130 recordings and transcribed about half of them for final analysis.

TECHNOLOGIES FOR DATA PROCESSING AND MANAGEMENT

One advantage of building an electronic dataset is that, with careful planning and organization, it can be mined for future projects. It is therefore important to create a durable, navigable system for archiving, storing, and sorting through electronic data in their both their raw and coded formats. This section will describe the tools and technologies that I used processing and managing the qualitative Eloqi dataset.

Data Storage

By the end of the data collection phase, I had amassed a sizable collection of files, all of them digital. My first order of business was to securely store these data and to ensure that all files were neatly organized in a way that allowed me to quickly find what I needed, when I needed it. I saved everything on my laptop and backed it all up onto a portable external drive. Although I did carry my laptop with me (to work, on trips, etc.), the external drive remained safe in my home. To further enhance security I made both devices password-protected. To organize the data I developed a simple naming protocol that included the data type (interview, fieldnotes, trainer-student lesson, screenshot, etc.), the date that the lesson or observation took place, the time that the data were generated (if applicable, as with screenshots), and participant name (where relevant). Some filenames following this protocol were:

- Interview_student_20091012_Lucky.
- Interview_trainer_20091012_Jessa.
- Fieldnotes_20100122.
- Lesson_20091204_JessaLucky.
- Screenshot_20091204_0944_chatroom.

After naming files I placed them in folders by file type; i.e. all interviews stored in a file called "Interviews," all fieldnotes stored in a file called "Fieldnotes," etc. All of these files were nested under one master project data file.

Data Processing

At this point I was still working with a variety of file types, including images (png) text (Word documents), and audio recordings (MP3), so the next step was to convert all the data to a usable format. This meant transcribing the audio recordings of the interviews and trainer-student lessons, and then converting all project files to rtf or pdf for use with my qualitative data analysis software.

Transcribing Audio Recordings

At the end of my data collection phase, I had collected roughly 150 separate audio files of trainer-student lessons, trainer interviews, and student interviews. Of these I fully transcribed about 50 files comprising 30 hours of talk. There are now interesting software options on the market to support transcription by easing playback and inserting hyperlinked time codes. Inqscribe, for example, is a relatively new Mac compatible transcription program. At the time of this project, however, limited choices and funds meant that I selected software that I already had access to. For audio playback I used VLC, a free program for playing multimedia files. To type up the transcripts I simply used Microsoft Word. To create the transcripts I opened both programs and kept their two separate windows open, side by side. I played back the audio recording while simultaneously typing up the transcription. I transcribed the talk verbatim, and for some sections where it seemed important I also included Jeffersonian notations (see Atkinson & Heritage, 1984) to preserve audible paralinguistic information. While this configuration certainly eased the process, there is no way around the fact that transcribing talk is an arduous, time-consuming task, particularly when including additional notations. The one great advantage of transcribing talk from scratch is that it enables the researcher to engage in a close reading of the data, which is a useful precursor to the analysis phase of the research (Lapadat & Lindsay, 1999). To create a basic transcription without notations, I generally needed about four times the amount of actual talk time; that is, 15 minutes of talk took roughly 60 minutes to transcribe.

Converting Electronic Project Files

The final step in the data processing phase was to convert all my project files for use with the qualitative data analysis (QDA) software that I had selected: TAMS Analyzer (more on this later).

Most qualitative data analytic software programs are built to support a limited number of file types. The TAMS version that I was using (4.12b3h) allowed for coding only into rtf, pdf, and jpeg files. Audio and video files could only be used in that version of TAMS for playback – not for actual coding. My preferred format was rtf because rtf files could be edited inside TAMS.

To convert the word documents to rtf, I opened up each file one-by-one and clicked "Save as," then selected rtf as the file type. To convert files into pdfs I used Adobe Acrobat X Pro. With this software you can open any file, click "Print" and then select "PDF" or "Save as PDF." This creates a pdf copy of the original file. An important side note is that with TAMS Analyzer, as with most other qualitative software programs, the files that you import into the program are earmarked only for that program's use. That is, the files that you save and import into the program must never be opened or used again except from within that program. For this reason, it is imperative to avoid importing original documents (or the only set of documents) into QDA programs. Rather, one should always make copies of all original files and import those copies into the QDA program. Original digital files should be kept elsewhere on the hard drive and ideally on a separate device.

SOFTWARE FOR QUALITATIVE ANALYSIS: TAMS ANALYZER

Once the data processing phase was complete, my dataset contained 130 digital audio recordings and 60 transcripts of trainer-student lessons; 7 digital audio recordings and 9 transcripts of student interviews; 12 digital audio recordings and transcripts of trainer interviews; and 10 month's worth of digital fieldnotes and screenshots from my participant observations. The next step was

to import these data into the QDA program that I would use for coding and analysis: TAMS Analyzer (Weinstein, 2008).

I selected TAMS Analyzer primarily because it is free, written expressly for MacOSX, built to support the type of data (electronic text files) that I was working with, and perfectly suitable for use by a solo researcher. Had I been working with other file types, using a different operating system, or coding with other researchers I might have selected a different QDA program. Transana, for example, is highly recommended for video data, ATLAS.ti is excellent for multimedia and geospatial data (but only works on Windows), and Internet-based services like Dedoose are well suited to team projects.

Like other QDA programs, the main function of TAMS Analyzer is to support qualitative coding. Coding can be initiated in TAMS after importing data files into the program. To code you simply open a data file (transcript, fieldnotes, etc.), select a passage/excerpt, and attach a code to it. New codes or families of codes can be created on the fly, and they can be paired with descriptive information to help maintain a record of what the code means. Once codes have been created they appear alphabetically in the "Codes" library for that specific TAMS project, and they can be applied to excerpts from that moment on. Even better, TAMS supports overlapping and nested codes, so any given passage can have multiple codes attached to it as needed.

It is easy to set up *a priori* codes in TAMS, but in keeping with the EC framework, I did not do this. A priori codes are often eschewed in ethnographic studies because of the ethnographer's commitment to avoid "...preconceived categories [which] can blunt the keen edge of observation, ignoring differences important to those in the scene while giving undue importance to categories of less consequence" (Wolcott, 1999, p. 134). EC

Figure 3. TAMS Analyzer coding window with sample code list and coded data
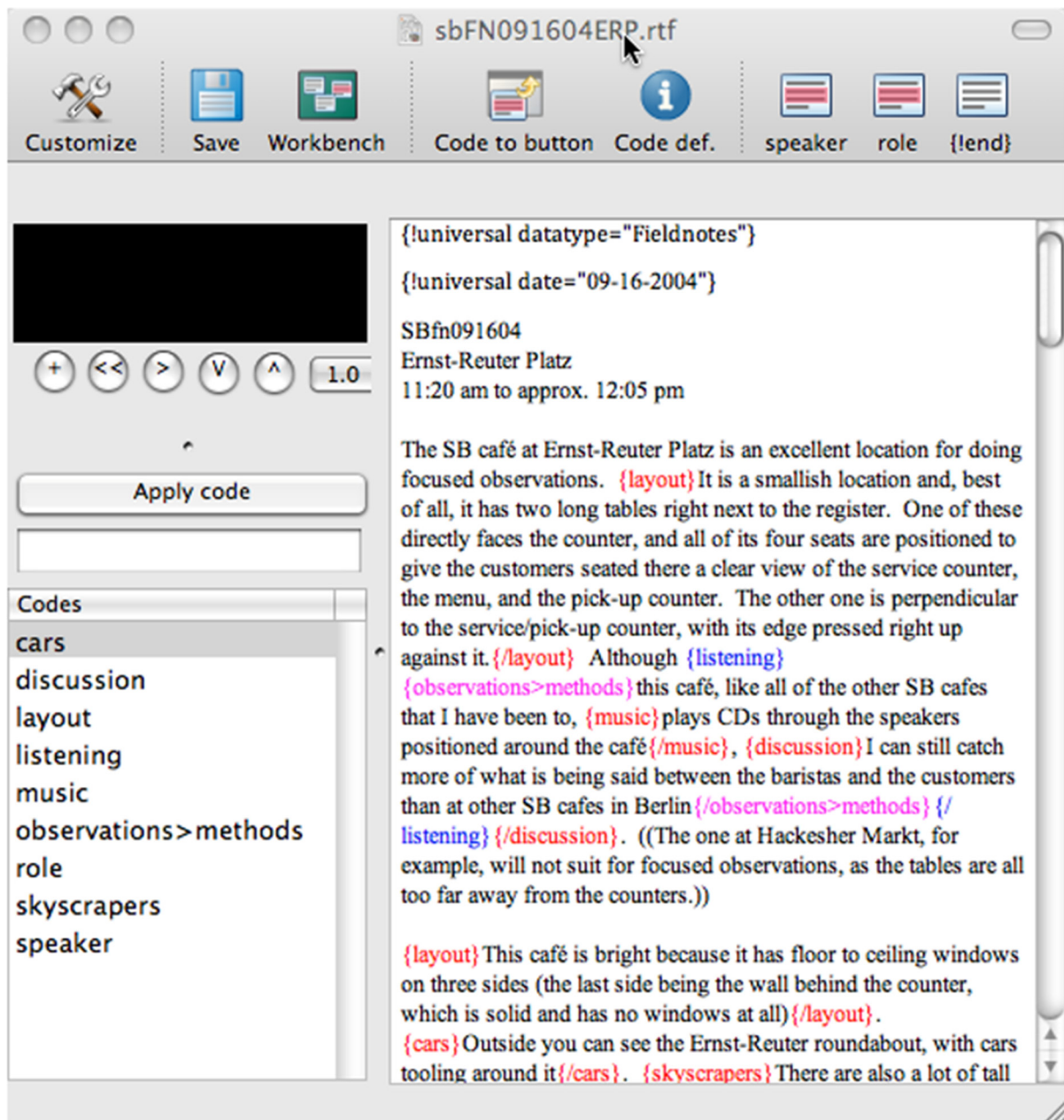
researchers do not generally test predetermined concepts. Rather, in EC studies the researcher is expected to report on the situated realities of the research participants. In other words, one should first describe the situated, contextualized communication as participants experience it (Hymes, 1962, 1972, 1977; Philipsen, 1975, 1992, 1997; Philipsen & Coutu, 2005; Wolcott, 1999).

I did use TAMS Analyzer to apply context codes to the data. Context codes, which can be applied

to either excerpts or entire files, allow the user to tag data with meta- or contextual information. The context codes that I used in this project were:

- Informant's role (trainer, student, administrator).
- Location associated with the data (chat room, trainer meeting, lesson).
- Data type (interview, fieldnotes, lesson, forum, team meeting).

Context codes are extremely useful in analysis and report generation. In TAMS they appear as separate columns and thus show you at a glance what contexts your coded passages are associated with. In this way they help a researcher organize and make sense of the coded data.

Using QDA software to attach a code to an excerpt is simple – it's the intellectual work of developing qualitative codes for a complex data set that is challenging. However, in keeping with the EC framework I assumed that there would be discoverable order, or structure, in my participants' communicative activities (Philipsen, 1992). To bring this structure to light, I engaged in analytic induction, which involves "inferring meanings from the data collected, rather than imposing such meanings on the data from another source… [looking] for emerging patterns in the data and [revising one's] tentative formulations as [you] proceed to collect and analyze more data" (Frey et al., 2000, p. 281). "Emerging patterns" implies that structure is discovered organically, as it presents itself in the data and in the informants' reports on what they do and why.

For the first-level (also called open) coding phase I diligently went through each file that I had imported into TAMS Analyzer, reading and rereading the materials line by line. I scrutinized the material for high-inference categories (Lindlof & Taylor, 2002) that pertained to my research questions. As I read I created codes on the fly. These codes ran that gamut from describing specific activities (customer service, grammar, small talk), to perceived psychological states (nervous, professional, friendly) to problems (technical breakdown, script issue, unpreparedness, tardiness) and many more, including feedback, rules, relationships, scripts, problems, procedural knowledge, self disclosure, sense of place, goals, communication strategies, politeness, impact, encouragement, asking questions, monitoring, multitasking, terminology, patience, status, and misunderstandings. By the end of the first level coding phase I had inductively developed about 80 high-inference categories of communicative behavior, which I subsequently named and identified throughout the data (see Berg, 2001; Strauss & Corbin, 1990).

The next step was second-level coding. During this phase I looked at the original codes and code categories that I had generated in TAMS and refined, developed, described, and explained them (Berg, 2001; Strauss & Corbin, 1990). Some categories dealing with multiple aspects of the same subject I combined, and others, which seemed less relevant to my study, I abandoned. At the end of this phase, I had condensed the original 80 categories into about 45 major categories and sub-categories. Throughout the coding process my research questions and my theoretical framework guided me. In this way I was able to identify the patterning that formed the basis of my findings.

Qualitative data analysis is a messy, nonlinear method (Markham, 1998), but the simple yet powerful functionalities of QDA software can be extremely helpful in bringing order to this process. Like other QDA programs, TAMS Analyzer can be used to quickly and easily create codes, and also to change codes names throughout the dataset, create memos attached to codes and excerpts, link files, and view coded passages within the context of the original files. Best of all, when using TAMS you can quickly and easily run both general and specific searches, and generate reports on the search results. For example, I could search for all instances of a particular code and then further sort through, group, and/or narrow

those results by data type, date, location, role, etc. Other useful functionalities of the software were the data comparison function, which allows users to examine co-occurrence of codes; the code count function, which helps you generate a list of extant codes along with the number of coded instances for each one; and code count by file, which produces counts of each code per file. In this way, a QDA program can be used to categorize data; sort through coded excerpts; identify connections between code categories; and further analyze the data for patterns and themes.

It is important to note that QDA programs like TAMS Analyzer do not do the analysis for the researcher. Rather, a researcher would use TAMS for finely navigating, sorting through, categorizing and retrieving data in large and complex digital datasets.

TECHNOLOGIES FOR REPORTING

One final point worth noting pertains to anonymizing digital data files for reporting purposes. For the final write up I wanted to use data excerpts as well as selected screenshots (jpeg and png files) in my manuscript. Before including of this data in my reports I needed to anonymize it. With the textual excerpts I needed to change the names of the participants, and with the images I needed to remove all identifying features, including names, usernames, avatars, and logos. To change the names I simply used the find and replace feature in Microsoft Word. This feature is particularly helpful because it shows at a glance how many instances of the searched-for word (or words) appear in the document. Because this information is hyperlinked you can simply click to be taken to any particular instance. To anonymize the screenshots I chose two different Mac-compatible programs: Skitch and Pixelmator. Skitch is free and works on various devices and operating

systems and has limited but useful features for adding text, colorful call-outs, and hand-drawn graphics to digital images. Pixelmator must be purchased but is specifically for MacOSX and has a broad range of sophisticated functionalities. For my purposes, the key task was to erase small portions of the screenshots and then camouflage the blank areas with matching background colors. Once the images had been appropriately edited I inserted them into the final report, which I then printed as a pdf.

REFLECTIONS AND ADVICE

In preparing this chapter I have documented the technologies and related competencies, preparation, and resources used in this particular Ethnography of Communication. The keys to using an array of different technologies to conduct such a qualitative study are mostly foresight and preparation. In this section, I offer some final points of consideration for researchers undertaking similar projects.

- **Project Arrangements:** Are you embarking on a solo project or a team project? If you're part of a research team, do you have access to a shared server where the data and data analytic tools can be stored? If not, how will you share information with one another? If you're using a QDA program, is it built to support team and/or multi-sited analysis? Before selecting any tool or platform for data collection or analysis, make sure that it will adequately support your project arrangements.
- **Data Type:** What type of data (video, audio, text, still images, maps, etc.) do you plan to collect and are your data analysis tools compatible? QDA software packages usually accommodate only certain types of

data. If you wait until after data collection to choose a QDA program, the type of data you have collected will dictate your choice.

- **Compatibility:** Before choosing any type of hardware or software, make sure that it is compatible with the machines and operating systems that you, your research team, and your research participants will be using. Not all programs have cross-platform compatibility and may be limited to particular machines or operating systems.

- **Cost:** Studies of online environments can significantly reduce or even eliminate costs associated with traveling to or living for extended periods in a field site. There are other costs, however, and these need to be anticipated. Is the software free? If not, is it something that you will purchase one time only, or is it subscription-based? Are trial versions available? Are there discounts for students or educators? Will additional hardware be needed to maximize its utility?

- **Usability:** What is the typical learning curve for the tool? Can you successfully pick it up and start using it within your time constraints? What user support (customer service center, online forums, manuals) exists? Who will you and your research participants turn to if there are any problems?

- **Security:** Protecting data is almost always a requirement for Human Subjects approval, which in turn is required for most ethnographic (whether online, offline, or hybrid) research projects. It is therefore critical to have strategies in place for keeping digital files and data secure. Rather than storing data on a personal device (particularly those that are carried into field sites) it might be preferable to have all data on external hard drives that can be locked in the researcher's home or office. At the very least, all devices that hold research data should be password protected.

- **Requirements for Functioning in the Field Site:** What technical knowledge will be required to study your chosen field site and/or engage in fieldwork there? If it's an online environment, what knowledge or skills are required to be competent there? Of course, it isn't always necessary to be competent at the outset, since a legitimate part of ethnographic research is exploring what it means to be competent in the field site, and how members develop or acquire that competency. However it can be challenging when a researcher must balance data collection with functioning productively in the environment under study.

- **Other Knowledge and Resource Requirements:** What special technical knowledge will be required of the researcher to use the array of tools and technologies selected for the project? What requirements will there be for the research participants? For those participants who are communicating via web-based channels, do they have adequately fast Internet access? Will they have to acquire additional hardware or software to participate and, if so, will it cost them anything? Do they feel knowledgeable and comfortable enough to use the proposed communication setup?

- **Reporting:** What sorts of reports (textual, visual, etc.) are needed, and does the technological configuration have the capacity to produce them? How will the data files be anonymized? This is worth thinking about early in a project when there is still flexibility in determining the type of data to collect and the format (digital, analog, image, text) to collect it in.

- **Durability:** Can the coded data files be saved or exported in a format that will be viewable and usable without the original software/tools? If you are using a subscription-based program, what will happen to

the data once the subscription is discontinued? If you switch to a different QDA program, will you be able to import your original data files and/or your coded data?

CONCLUSION

The technologies that I selected to support data collection and analysis for this Ethnography of Communication project allowed me to gain regular access to a virtual community, observe and participate in the activities there, collect information on these experiences, reach out to community members, and make sense of the data that I had collected. Technologies not only allowed for the existence of the Eloqi community, they also enabled me to study it. It was an informative – even transformative – experience that, with preparation and patience, I recommend to my fellow communication studies researchers.

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KEY TERMS AND DEFINITIONS

Ethnography of Communication: A theoretical/methodological framework for studying communication and communication practices in the natural contexts in which they occur.

Ethnography: A theoretical/methodological framework for studying human culture and activities in the natural contexts in which they occur.

Fieldnotes: Detailed textual materials produced by researchers describing their observations and/or participant observations.

Participant Observation: A method for studying contextualized human activity; the researcher not only observes the community under study but also participates in its activities.

Qualitative Coding: An approach to analyzing qualitative data in which the researcher carefully scrutinizes the data and tags it with descriptive labels, i.e. codes. These codes are used as interpretive resources to identify recurring patterns in the data.

Speech Codes Theory: A theoretical/methodological framework for studying human communication activity and the patterned norms, premises, and rules that pertain to communication in a given community.

TAMS Analyzer: A free software program for MacOSX, used for supporting qualitative coding and analysis.