Collecting natural interaction data in a factory: Some methodological challenges

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Abstract

Since 1996, the Language in the Workplace Project[i] has collected a corpus of over 500 spoken interactions involving about 350 people from a range of workplaces in New Zealand. To date most of this data has come from professional office workers in large organisations, where the project's unique participatory method of data collection was first trialled and developed. This poster provides an overview of the most recent stage of the project, a pilot study of communication patterns in a 20-strong production team in a Wellington factory undertaken in early 1999, and shows how the project methodology was adapted to meet the technical and logistical challenges faced in this new environment.

The Language in the Workplace Project

The Language in the Workplace Project is based at Victoria University of Wellington. The general aims of the project are to study naturally occurring workplace interaction in order to identify the characteristics of effective communication, diagnose possible sources of miscommunication, and explore possible applications of the findings for New Zealand workplaces.

Existing methodology

During 1996 and 1997, the Language in the Workplace team collected over 300 spoken interactions from four New Zealand government agencies, mainly from policy and advisory units. The bulk of the data consists of small, relatively informal work-related meetings and discussions ranging in time between twenty seconds and two hours. The methodology developed for this phase of the project was designed to give participants maximum control over the data collection process (see Stubbe 1998, Holmes in press). After a seminar-style presentation from the research team, a group of volunteers from each workplace tape-recorded a range of their everyday work interactions over a period of about two weeks, and provided some contextual information on each interaction. Several formal meetings from each workplace were also videotaped. Throughout the process participants were free to edit and delete material as they wished, or to ask the research team to edit out material which they felt in retrospect they did not wish us to analyse. By handing over control of the recording process in this way, an excellent research relationship with our workplace participants was developed, based on mutual trust.

More recently, the methodology has been adapted to collect different types of data from a wider range of workplaces. These datasets include formal meetings in large corporate commercial organisations such as Mobil Oil (NZ) Ltd and New Zealand Telecom; routine work and social interactions in small private

businesses such as garden centres in the Hawkes Bay area; directives in a hide tanning factory in Auckland; and factory floor interactions in a Wellington soap products factory.

The Factory Pilot Study

The research team was approached by a manager from a Wellington soap products factory who was interested in collaborating with the project team on some action research[^] relating to the evaluation and development of communication in self-managing teams at the factory. The company was happy for this collaboration to become a part of the wider project.

We were offered the opportunity of working with a production team, the 'Power Rangers'[ii], considered to be a top performing team in the plant. The team coordinator (TCO) was particularly interested in further improving

communication within her own team, while the factory management wanted information that they could use to assist other teams perform to a similar standard. The research team hoped to use both the data collected, and the collaborative action research process itself, as a basis for developing a more widely applicable communication evaluation and development model for use in New Zealand workplaces.

Our initial discussions with the TCO, and a tour of the very busy and noisy factory floor, very quickly impressed on us that our existing methodology would have to be substantially adapted in order for us to collect any useful data in this setting. It was therefore decided that as a first step we would undertake a pilot study to collect some baseline information, and to determine the feasibility of collecting a dataset that would meet our joint objectives. This pilot would also serve as a means of trialling the necessary adaptations to our existing methodology.

Team Profile

The primary language of communication in the factory is English, although the workforce is multicultural, with many people for whom English is a second language. This particular department of the factory runs a 24 hour/7 days-a-week operation, with each team working four days on, four days off. The 'Power Rangers' core team at the time of the pilot study had 20 members, was predominantly male (with only 4 women), and included more than 50% Maori and Pacific Island staff, half of whom were Samoan.

The production team works in two separate areas. One is a manufacturing area upstairs, where operations are monitored from a computerised control room. People are constantly moving in and out of this room, a radio is on all day long, and there is a radio intercom which is also in regular use. The second area is the packing line on the factory's ground floor. Here, talk often occurs only intermittently in order to impart specific information or instructions, and the workers move around a lot as they monitor machinery. The packing team only meets together once a day at the start of each 12-hour shift. The manufacturers hold their own short briefing. Manufacturing staff and packing line staff do not interact physically during the course of the day, except if an effort is made by individuals to make face-to-face contact. Contact between manufacturers/packing line/stores is maintained mainly through use of the factory-wide intercom radio system or telephone calls.

Methodological challenges

As the brief 'snapshot' above clearly shows, there were a number of challenging technical and logistical problems to resolve before we could successfully collect natural interaction data in this environment. We also faced some tricky ethical issues around the relationship between the research team, factory

management and the participants themselves. These issues are briefly outlined below:

Logistical/sampling issues

s   gaining sufficient understanding of an unfamiliar working environment and culture to allow meaningful analysis and interpretation of the data

s   identifying and collecting a useful and representative sample of natural interaction data from a dispersed workforce engaging in limited face-to-face interaction

s   balancing the need to have an outsider on site to do the recording with the aim of observing and recording natural interaction patterns

s   physical aspects of recording, e.g. safe placement/carrying of equipment, routines for changing and storing tapes when informants move around constantly

s   obtaining essential contextual information about each interaction

s   loss of non-verbal data in an environment where signals and gestures are an important channel of communication.

Technical issues

s   obtaining good recording quality in such a noisy environment, and in a range of different situations

s   matching equipment to the conditions (safety, comfort, unobtrusiveness, security)

s   limitations on the length of time we could record at a stretch (tape length, batteries/power)

Ethical /relationship issues

s   gaining the trust and cooperation of team members

s   ensuring all recording/notetaking is done with informed consent, and that all participants feel able to withdraw from all or any recording

s   ensuring that consent is freely given, and not simply compliance with management wishes

s   building in 'face validity'- ensuring that participants understand fully what we are doing and why, and that they are satisfied with the level of feedback they will get.

Adapted methodology

Our key objective was to retain the participatory approach that characterised our existing methodology, and to ensure that individuals still had maximum control over what data was collected from them. However the data collection process would clearly have to be much more 'hands-on' than before- it would not be possible just to hand over the task of selecting and recording interactions to workplace volunteers as we had done previously, as this sort of activity is not compatible with the nature of work in a factory.

The approach we took, on the suggestion of the TCO, was for her to introduce our fieldworker, Megan Ingle, to the team over several shifts. Initially she would be there only as an observer, and then gradually try out the recording equipment as the team members became more familiar and comfortable with the idea

of the study, and were in a position to give their informed consent. The pilot study was carried out over a period of several weeks, and had three main stages:

1 Extensive observation

Our fieldworker spent a total of 25 hours over two 4-day shifts on initial observations. This allowed her (i) to become familiar with the factory layout and procedures, the team's work and communication patterns, and team dynamics; (ii) to investigate potential recording situations and identify technical problems, and (iii) to gain the acceptance of the workers.

Initially the team was wary of the fieldworker, and somewhat suspicious of what she was doing there. They wanted to know why a group of university researchers would want to record them-"Who could be interested in what we say?", what the team would get out of the process, and who would be allowed to look at the information or listen to the recordings. She was also very conscious of being a young European female from a university background going into a workplace where people had less formal education, and where the majority of people were older men from a range of different ethnic groups.

The TCO was an invaluable go-between, smoothing the relationship with the rest of the team, and providing a wealth of background information about the team and her own communication and work practices. At her suggestion, the fieldworker approached each team member individually during this period to introduce the study, discuss their work roles and practices, and generally establish an ongoing rapport. She also explained that we would be taking an 'appreciative inquiry' [iii] approach to the data (Hammond, 1996), and that other factory staff, including management would not be allowed to listen to the recordings without the express permission of those involved. The one-to-one approach was suggested by the TCO, because she considered it was neither practical nor culturally appropriate for us to talk to the team formally as a group about the project. Her experience was that people would feel freer to ask questions and voice their reservations if approached individually. This was especially important when it came to the point of asking for formal consent to be recorded, so this strategy was adopted as the best way of ensuring that team members would not feel pressured to participate in the pilot study.

2 Technical checks

Systematic technical checks were carried out to establish the best combinations of equipment to use in different settings. Unsurprisingly, the combination of small Walkman cassette recorders and high quality lapel microphones we had used successfully in office settings was completely inadequate in this environment. During the pilot we achieved acceptable results from a Sony Professional Walkman in combination with a Soundgrabber microphone in the control room, a high quality omni-directional lapel microphone for 'wiring up' individuals in static and less noisy situations such as the morning briefings, while for those workers who moved about the factory floor we used radio microphones. The latter produced good results, especially in situations with a lot of background noise, and had the added advantage that the person wired up was not constantly reminded that they were being recorded by the need to change tapes over every 30 minutes. However, the person wearing the transmitter did sometimes move out of range of the receiver.

We achieved the best results when we started to use portable digital minidisc recorders along with the various microphone options above. Using these produced a significant improvement in the sound quality achieved, and they had the added advantage of allowing an extended recording time of 148 minutes, together with a full random access editing capability, which proved invaluable in a situation where there are often long intervals between interactions.

3 Data collection

Recording was undertaken for a rolling three to four hours a day over successive shifts in order to obtain samples from each part of a typical day and each day of 4-day shift. Because of the nature of the team's work and the factory environment, it was impractical to expect the team to take any responsibility for the mechanics of recording interactions or related contextual information. Our fieldworker therefore remained on-site throughout each recording period to change tapes and batteries, write-up interaction notes, obtain ethnographic information, and begin data processing.

We limited the exercise to audio-recording, despite the fact that video data would have added a useful extra dimension to our analysis. On the basis of a trial shoot to obtain some reference footage of the plant, we judged that introducing a video camera would have been too intrusive, and would have created a number of further technical and logistical issues. In any case, video-recording was flatly rejected by several of the team initially, although they became more comfortable with the idea once we had completed several days of audio-recording. The selective use of a small digital camera with zoom lens, connected to a radio microphone, remains a possibility for future data collection projects.

Our fieldworker had to balance the practical requirements of data collection (e.g. servicing equipment, recording contextual information) with being as unobtrusive as possible in order not to interfere with the team's usual patterns of work and communication. She also had to adopt different strategies for different areas and times of day. Briefing meetings were recorded by wiring up the team leader with a lapel mike beforehand, and leaving a second recorder switched on with a soundgrabber microphone to pick up comments from the floor. Interactions in the control room upstairs were captured by leaving a recorder with a soundgrabber switched on in a central position, and coming in every half-hour to turn over the tapes. This also provided a regular opportunity to find out what had been going on, which was very useful in the initial stages. Later we switched to using minidisc recorders so that we could record uninterrupted for over 2 hours. On the packing floor, one or two 'key' individuals carried radio microphones for 2-3 hours at a time. The changing over of microphones provided a natural point at which to gather background information, with people generally reporting that they had quickly forgotten about the fact they were being recorded.

Evaluation

The pilot study was more successful than we could have dared to hope. By the end of the two-month period, we had established an excellent working relationship with the 'Power Rangers' team, who were happy for us to return at a later date. We had proved that, despite our initial misgivings, it was indeed possible to record usable natural data in this environment and to collect related ethnographic material without disrupting the team's work to any great extent. We had also fine-tuned the technical and logistical issues sufficiently well to feel confident that we could successfully proceed with more closely targeted data collection. Finally, we had managed to gather a wealth of background and ethnographic information and 30 hours of analysable recorded data (albeit sometimes of varying technical quality!). This provided a useful baseline for providing some initial feedback to the team and factory management, and for planning the next stage of the action research collaboration.

Implications and Applications

Since the pilot study was completed in April, the Language in the Workplace team and factory staff have agreed to proceed to the next stage of the project, starting in August 1999[iv]. This will follow an action research model, and will involve further targeted data collection and analysis, followed by collaboration on the development of communication evaluation and training resources for use within the factory. Possible applications include a team development programme, mentoring for managers and team coordinators, and learning support for NESB workers. The results of the data analysis and the practical applications developed in this factory will also provide a basis for further research into workplace communication, and for the development of communication evaluation and development tools aimed at a wider audience.

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[ii] All names given here are pseudonyms.

[iii] This involves looking for what is done well, with the aim of finding ways to share strengths with others and develop them further, as distinct from looking for 'problems' and setting out to 'solve' them.

[iv] At the time of writing, we had just completed the first two weeks of intensive data collection using a fine-tuned version of the methodology described in this paper.