A psycholinguistic analysis of emergency (999) telephone calls to the fire brigade.

by

Miriam Comber

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Department of Psychology
University of Surrey
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ABSTRACT
This study examines three aspects of conversational management in emergency (999) telephone calls made to the fire brigade: turn-taking, the use of speech acts and the transmission of information. Examination of the 16 longest calls in the corpus showed two problem types, situation specific and information transfer. The occurrence of situation specific problems was linked to longer calls. Turn-management behaviour was studied in 146 calls. Both operators and callers interrupted more when the caller was a woman. No difference was found in the distribution of speech across role or sex. Operators used significantly more assent words than callers. Speech act management was examined in 91 calls, using Conversational Exchange Analysis (Thomas, Bull and Roger, 1982). Operators and callers used different repertoires of speech acts. The operator also used acts which lead to predictable responses from the caller. The questions asked by the operator in 92 calls were categorised by the type of information requested and the sequence of questions was analysed to determine whether the operators used Requests to structure the call. The majority of probable transitions were between repeated instances of the same question. The sequence of questions could be predicted only at the beginning and end of the call. Information transfer was studied using three measures in 72 calls: method of information transfer, lapses between the parts of transfer sequences and errors in transfer. Different items of information were differed on all three measures. Finally, turn and speech act management were examined together, in 89 calls, using Facet Theory (Gratch, 1973) and multidimensional analysis. Two facets emerged, task and degree of interventionism. The conclusion of the study is that conversation management within these calls is strongly influenced by the interaction situation.
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CHAPTER 1

INTRODUCTION

This study sets out to examine aspects of conversational management in emergency (999) telephone calls to the fire brigade.

999 calls are interesting because, while they are similar to other telephone calls in many respects, they have some unusual features. Like all telephone calls there is no visual link between interactants. Like many calls they take place between strangers, and they are focused on a task. Unlike the majority of telephone calls they take place under real time constraints.

Because the 999 telephone line is the main link between the public and the emergency services, in the most extreme cases the prompt attendance of the fire brigade at an incident, and ultimately human life, may depend on the efficiency with which these calls are completed. But while not all fires are life threatening and many alarm calls are not to fires, every call received at a fire brigade control room could be a report of a serious incident and must be approached in this light. In these circumstances delays or misunderstanding could contribute to disaster.

The importance of efficiency in these calls would suggest a need for the interaction to be managed so that the operator can glean the necessary information in the shortest time possible. It is proposed that this conversational management grows out of the purpose of the interaction with the two participants acting as they do to achieve their objective, that is, form follows function.

Three aspects of conversation management will be studied:-

i  Turn management, the organisation of who speaks when and for how long.

ii Action management, how the participants use speech as action, and

iii topic or information management, how the participants deal with different topics in the conversation.
Apart from their sense of urgency and potential danger, these calls are like many other telephone calls and in particular a type of call becoming popular. This is the type of call which involves a member of the public and a professional. The public are being encouraged to use the telephone in circumstances where personal contact or the post would have been used in the past. Examples of this change are in the use of the telephone to order goods and services and the use of fault lines or 'hot lines', particularly with computer software.

Therefore, while the use of the telephone is increasing rapidly (Rutter, 1987) of more interest is the increasing number of ways the telephone can be used. Technological development has led to telecommunications systems more complex than the usual one-to-one telephone link being developed, for example conference links and video links (Rutter, 1989). The use of this new technology is still quite rare however. For ordinary users the impact of new technology has been in the increases in the ways that normal telephone lines can be used. This technology may have little or nothing to do with telecommunications. Where computers are used to store and to access information quickly enquiries can be dealt with in the short time period of a telephone call. As more and more information is held on computerised databases rapid access to all kinds of mundane information will be possible over the telephone. Therefore the telephone can be used instead of a letter.

A simple example of the change brought about by the use of computerised databases is the change in procedures used in directory enquiry calls. In the past the operator asked first for the town, then the name. This was non-intuitive for the caller who wanted a person's telephone number, not that of a town. Now that the system uses computers the operator can ask the more obvious question, the name, first.

Companies and charities also make use of the new technology of plastic money to allow people to pay or donate by telephone. Indeed, financial services are now recognising the convenience of the telephone, most
noticeably with the launch in 1989 of First Direct, a banking services based primarily on the use of the telephone.

A combination of computers and credit cards allows American shoppers to order goods over the telephone by simply using the dialing pad as a miniature keyboard. This system is also used by at least one company (Microsoft) to allow callers to route themselves to the service they require, rather than using a switchboard.

This combination of new technologies has broadened the range of the types of call ordinary users may make. Jones and Gerard (1967) describe four types of social interaction contingencies differentiated by which moves in the conversation interactants react to. In pseudo-contingency the interactants do not react to each other, except that they time their utterances to interleave. An example of this type of contingency would be a play. Asymmetrical contingency describes the situation where one party has a plan which s/he follows without reacting to his partner. The partner reacts to each move made by the person with a plan. The case where each party reacts to the last move of the other is termed reactive contingency. This would describe rambling conversation as it takes no account of the history of the conversation. Finally, in mutual contingency each party has a plan which they follow while also reacting to their partner. In this case there is both cooperation, in the reaction, and competition as each person has his own goal.

This classification can also be applied to telephone calls. However, there are also telephone calls where no interaction takes place. The best known example of this type of call in the past was the speaking clock. Now, an increasing number of services offer 'pay and listen' telephone links. Because of the new varieties of telephone call, it is useful to break these calls down first according to whether any interaction takes place.

Telephone calls can be broken down into those that are one-sided non-interactive, two-sided non-interactive and two-sided interactive. One-sided
non-interactive calls include those to phone-in services where the caller can listen to a taped voice. These can range from the speaking clock through horoscopes to advice on sexual problems. In these cases the telephone operates rather like an expensive programmable radio. The caller cannot interact in any way, neither by speaking nor by changing the course of the message.

In two-sided non-interactive calls the caller may have some input by speaking, but the course of the call is predetermined and cannot be altered. This would be an extreme case of asymmetric contingency. Examples of this type of call are competitions where the caller choses the correct answer to a question by saying a predetermined word after the chosen answers. Computer Aided Telephone interviewing systems have been developed which use the same system, while some can record answers to open-ended questions (for example, by Continental Research). While some systems use branching routines dependant on the responses received from the caller, the possible branching routes are set up before hand. Therefore, although the caller does influence the course of the call this is only in a limited, predetermined way, the course of the call is not jointly constructed.

One well known example of a two-sided non-interactive telephone call is provided by the answering machine. Here the interaction has a very simple structure; owner's message - caller's message. The caller's only input to this structure is his decision to leave a message or not.

For all of these types of call the purpose of the interaction is defined at the outset and interaction is strictly limited to that purpose. With two-sided interactive calls the definition of the call's purpose and the extent to which the call is focused on that purpose can vary. At one extreme are calls to booking services for example. Here the purpose of the call is quite simple and decided in advance. The parties do not expect any social interaction although some may occur. The conversational structure can therefore be simple and revolve around the task. These would be asymmetrically contingent. At the other extreme are social calls. These may have a vague purpose, or there may
be a particular task to be performed, for example making arrangements to
meet. In most cases, however, the interactants would be surprised if the
coloration were limited to the efficient despatch of that task. These calls
may have a loose conversational structure, with topics being introduced in
reaction to the flow of the talk and not because of a predetermined plan.
These social interactions may vary between reactive contingency and mutual
contingency. Interaction based on reactive contingency would be most
dissimilar to task oriented calls as no task can be accomplished if neither party
has a plan.

Between these two extremes of assymmetrically contingent and reactively
contingent interaction are many types of task related call. In these
coloration the telephone is used both for the transmission of information
and for social contact and the balance between these two functions can vary
depending on the relationship between the participants, the purpose of the
call and on time constraints.

It is apparent that from one-sided non-interactive to two-sided interactive
calls the complexity of the conversational structure increases and
predictability decreases. The distribution of control over the conversation
also becomes more equally distributed.

Both computer assisted conversations and time constrained conversations
need control to be efficient. Not control in the sense of dominance but in the
sense that they need to be guided or steered. While purely social calls can
have a very loose structure, these constrained calls cannot. Efficiency is
important for two very different reasons. For emergency calls the emergency
itself produces the urgency. For computer aided calls efficiency means
constraining the call to a simple structure so that the computer system can
handle it within its own constraints.

In the conversations of interest here, task-oriented calls between the public
and professionals, both parties have some control, each can affect the
direction the call takes. However, as the calls are task-oriented and as the
professional is experienced at that task, it is to be expected that they will try to manage the flow of talk so as to make that task easier.

In looking at how conversational management might be used at least three aspects need to be considered:- turn management, action management and information management. A fourth aspect, which might be termed social management, the development and maintenance of social relationships, will not be considered here for reasons which will be dealt with in later chapters.

Turn management concerns the rhythm of the dialogue; who speaks when and for how long. The interactants in a dialogue take turns at speaking. How they negotiate who's turn it is to speak and how and when to switch between speakers has been the subject of extensive study (see Beattie, 1983 for a review). Studies of this aspect of conversation concentrate on behaviours which are vocal, but not necessarily verbal, that is, the words used are not important. These vocal behaviours would include interruptions, filled pauses (mm, ah etc.), the length of the gap between one speaker finishing and the next starting, gaze and the number of words spoken. This aspect of conversation may be recognisable even in a foreign language.

Turn management can be used to stop another person speaking, or to indicate that the current speaker wishes to continue. The former can be achieved by the use of interruptions, the latter by filling pauses so that another person cannot start to speak without interrupting. Evidence for the use of turn management to control conversation is presented in chapter 2.

The second aspect of conversational management concentrates on language as action. This recognises that people use words to do things, to ask, to answer, to threaten and so on (Austin 1962). Any of these actions can be carried out using different forms of words, but the action remains the same. Actions are the basic building blocks of conversations, in fact, dialogue expressed as a series of actions can still be understood (Clarke, 1983). It also appears that some sequences of actions are more likely than others. For example, if one person asks a question it is to be expected that the second
person will reply with an answer. These short sequences have been referred to as adjacency pairs (Schegloff and Sacks, 1973). Here the first speaker invites the second speaker to take over, but constrains what they may say. Speech can therefore be used both to carry out actions and to influence the actions of another interactant.

The third aspect of conversation management, information management, concentrates on the content of the conversation. A more general term would be topic management. All conversation will address one or more topics. In task-oriented conversations these topics are of particular interest, as they will be relevant to the task. Because task oriented conversations are the subject of this study, the topics of interest concern the various pieces of information to be transferred. Each piece of information can be considered as one topic and for the call to be successful, this information must be transferred successfully. The interactants must deal with each piece of information as appropriate.

In everyday life people manage all three aspects of conversation without giving the process much thought. They decide what they want to say, how they will say it and whether it merits interrupting their partner. They take in what their partner says and respond appropriately either by making interested noises or by saying something in turn. However, with some noticeable exceptions (for example Rutter, 1984) these three aspects tend to be studied separately. Rutter examined the effects of cuelessness on three separate aspects of conversations: content, style and outcome. He demonstrated that there was a predictive relationship between content and both style and outcome. The argument of this thesis is that, since such relationships exist and since conversation can be managed in these three separate ways they must be considered in parallel.

The emphasis in this study, however, is not purely on conversation as material for analysis but also on the emergency call as an important conversational situation in its own right. The study of emergency calls is part of a much wider study of behaviour in fires (for a review see Canter 1980). This work has concentrated on the human aspects of preventing and coping
with fires. While fire risks can be lessened by engineering and by technology such as fire alarms and automatic fire warning systems they cannot be completely removed. Furthermore, it would seem to be more efficient to design any systems to take advantage of human responses.

Early responses to fires have a distinct pattern, with recognition leading to decisions about what actions to take and finally to a stage where people try to cope actively with the fire or leave the situation. The early recognition phase involves people reacting to what may be ambiguous cues: a smell, a sound, light in the sky or increased warmth. Recognising that these cues are danger signals may take some time and may involve checking with others.

While this checking goes on the severity of the fire increases and, more importantly, the rate of growth of the fire also increases. Thus the situation can go from potentially dangerous to extremely dangerous in minutes.

The fire at the Bradford City football ground on May 11th 1985 is used by Canter, Comber and Uzzell (1989) as an example of this point. It took three minutes from the start of the fire to the time a call was made to the fire brigade. The brigade arrived three minutes later. Thus the time taken to recognise the danger and take action was as long as the time taken by the fire brigade to mobilise. By the time the fire brigade arrived on the scene, flames had spread to the roof, and the back corridor was full of smoke. In these six minutes time was needed for recognition, for decision about what action were appropriate, for alerting the police and fire brigade and for the fire appliance to reach that site. Part of that time was taken by an emergency call.

This brief outline of response to fire has been included to underline the kind of time constraint acting on emergency calls. The average length of a call has been estimated at 45 seconds to receive a call and locate the address given by the caller, or 43 seconds with a semi-automatic system (Husain, 1981). While an increase of, say, 10 seconds on this time would not seem important for an ordinary telephone call, given the potential pace of the fire, these 10 seconds could have serious consequences.
999 calls to the fire brigade are essentially simple: the caller reports an incident and its address. They are also very frequent. For example, in the year the data for this study were collected the London Metropolitan Fire Brigade was receiving nearly 300 calls a day. Like any other simple system it only comes to public attention when something goes wrong.

One such example was a call made by the police to report the crowd crush which occurred at Hillsborough football ground in Sheffield on April 15th, 1989. Because of a simple misunderstanding this call was looked at by the inquiry into that disaster and also reached the front page of a national newspaper.

Fire brigade control rooms issue mobilising instructions on the basis of road names. It is interesting to note here that the police, who are also professionals with regard to emergencies, seemed unprepared to cope with this fact. The following is a verbatim transcript of the alarm call.

**Police:** Can we have cutting equipment for Hillsborough please, straight away?

**Fire Control:** Just a minute. Right, what's the address?

**Police:** Cutting equipment for Hillsborough football ground - straight away.

**Fire control:** Hillsborough football ground?

**Police:** Yes, Hillsborough football ground.

**Fire control:** What road is that on, do you know.

**Police:** There has been a major accident, all the ambulances are up there.

**Fire control:** What road is it on?

**Police:** I have no idea, Hillsborough football ground.

**Fire Control:** What road is it on, do you know?

**Police:** Hillsborough football ground, what road is it on? (this was said to someone in police force control). Penistone Road (said to fire control).

**Fire Control:** Penistone Road.

**Police:** Penistone Road. OK.

**Fire control:** Penistone Road. Just a minute - what's exactly involved?

**Police:** It's football, a big match, Liverpool v Notts Forest.
Fire Control: Yes, but why do you want us, you said it was an RTA (road traffic accident).

Police: No, no, no. Major incident inside the ground.

Fire Control: Major incident inside, do you know exactly what it is?

Police: No, I don't. They want all the cutting gear.

Fire Control: For what, do you know?

Police: Hang on a sec. (male voice) hello ..

Fire Control: Hello. Now, you want some cutting gear. What exactly is it for?

Police: There has been a major accident at Hillsborough football ground where the semi-final is, the crowds have forced their way in, they have broken fences and gates down, I don't know exactly what it is but there are people trapped.

Fire Control: Right, OK. Leave it with us.

The Guardian 14 June 1989

Some easily recognisable problems are encountered in this call. The operator asks for the road name three times before being given the name of the road at the wrong end of the pitch. The police assume that the fire brigade must know major landmarks, the fire brigade assume that they have been called to a road traffic accident.

This example has been included because it demonstrates how a simple system can break down, and how important those breakdowns can be. Complete breakdowns are, however, rare. It can be assumed therefore that some management is taking place to keep the conversations on track. In the example above, for instance, the operator uses the simple tactic of asking the same question repeatedly until s/he gets an answer.

This study will therefore examine the types of management strategies adopted in fire alarm calls. Before this is done, however, the idea of management itself needs to be considered. Although the term management has been used here, this phenomenon is often described as control or dominance. Each term has a slightly different emphasis and a different connotation. The subject of control will be discussed in the next chapter.
CONVERSATION MANAGEMENT AND CONTROL

CONTROL AND AFFILIATION

Conversation management implies taking control. It seems that control is a potent dimension for describing interaction. Previous discussion of types of phone call drew the distinction between highly structured task oriented conversation and more loosely structured social calls. This implies a single dimension from high to low control. There is evidence, however, that this is not a single continuum but that two dimensions, control and affiliation, can be used to describe interpersonal behaviour (Kiesler 1983). According to Smith (1985) the control dimension 'orders people, situations and episodes in terms of the extent to which they provide the opportunity for exerting active control over the process and outcomes of interaction' while affiliation 'orders people, situations and episodes in terms of their tendency to elicit warmth and approach versus aloofness and avoidance'. (Smith 1985 pp135-136). These two dimensions give a model for the description of interpersonal behaviour where those descriptions are ordered in a circular structure, a circumplex, with reference to the two main dimensions (Wiggins 1979). The control dimension may be described as 'ambitious - dominant' at one pole and 'lazy - submissive' at the other. The affiliation dimension runs from 'warm - agreeable' to 'cold - quarrelsome'. Intermediate points on the circumplex are, for example, 'gregarious - extraverted' (high control and high affiliation) and 'arrogant - calculating' (high control and low dominance) (Wiggins, 1982).

If interpersonal behaviour and motivation can be described by these two dimensions then it might be expected that those episodes or situations where that behaviour occurs can also be described in these terms. Both Forgas (1979) and Wish, d'Andrade and Goodnow (1980) have shown this to be the case for both hypothesised and real interactions. Although the number and labels of dimensions found in these studies varied slightly, they could be largely subsumed under control and affiliation.
Of these two dimensions only control is of interest here. Rutter (Rutter, 1987, Stephenson, Ayling and Rutter, 1976, Morley and Stephenson, 1977, Rutter and Robinson, 1981) has argued that no-vision conversation, for example telephone conversations, are more task-oriented and the participants more conscious of their roles than in normal vision assisted conversations. In a study comparing face-to-face and telephone tutorials among Open University students and their tutors, Rutter (1984) found that rather than simply being more task-oriented and impersonal during telephone tutorials, both tutors and students behaved more according to their role. Tutors spent most of their time structuring the interaction and asking questions, while students mostly answered these questions. Thus the participants behave less as individuals and more according to their perceptions of their role within this interaction setting when using the telephone. The tutorials conducted over the telephone were also less spontaneous and more structured by the tutor than were face-to-face.

Rutter et al suggest that this is because the effect of removing vision cues is to increase psychological distance. It is proposed that the effect of psychological distance is to reduce the tendency of the interaction to elicit warmth and approach, that is, that the affiliation motive becomes less pertinent to these interactions. As affiliation becomes less pertinent, interpersonal behaviour varies along only one dimension, that of control. Therefore, although affiliation may still play a part in no-vision conversation it can be expected that the control dimension will be more central to the organisation of the interaction.

In Chapter One, three aspects of this management were outlined; turn management, action management and information management. But now it will be apparent that the fourth aspect, social management, has little relevance in a task-oriented conversation, particularly where this is carried out by telephone.

Different models of the organisation of conversation place emphasis on these three aspects and studies of conversation management tend to be based on
particular models. Before going on to look at how management might be made manifest in verbal behaviour, these models will be considered.

MODELS OF TURN-TAKING, RULES, SIGNALS AND RESOURCES.  
Rules  
The first model to be considered, that of Sacks, Schegloff and Jefferson (1974), sees conversation, and thus turn-taking, to be a rule bound system. Sacks et al argue that a turn at speaking, that is, being in possession of "the floor" in a conversation, is a sought after resource. Distributive justice requires that there be a system to ensure that all parties get their fair share of speaking time. Of 14 rules which Sacks et al posit as governing conversation, only six are of interest here. These are;

2) Overwhelmingly, one party talks at a time.
3) Occurrences of more than one speaker at a time are common, but brief.
4) Transitions (from one turn to a next) with no gap and no overlap are common. Together with transitions characterised by slight gap or slight overlap, they make up the vast majority of transitions.
12) Turn-allocation techniques are obviously used. A current speaker may select a next speaker (as when he addresses a question to another party); or parties may self-select in starting to talk.
13) Various 'turn-construcational units' are employed; e.g. turns can be projectedly 'one word long' or they can be sentential in length.
14) Repair mechanisms exist for dealing with turn-taking errors and violation; e.g. if two parties find themselves talking at the same time, one of them will stop prematurely, thus repairing the trouble.

Sacks, Schegloff and Jefferson (1974) pp 700-701

An important concept in the Sacks et al system is that of the turn-construcational component.

"These are various unit-types with which a speaker may set out to construct a turn. Unit-types for English include sentential, clausal, phrasal and lexical constructions. Instances of the unit-types so usable allow a projection of the unit-type under way, and what roughly it will take for an instance of that unit-type to
be completed. Unit-types lacking the feature of projectability may not be usable in the same way." (ibid p702)

A speaker who starts a turn is entitled to one turn constructional unit, and the completion of the first unit constitutes a transition-relevance place. At this point another speaker may legitimately take their turn to speak. If the turn is not claimed by another speaker, the current speaker may carry on and produce at least one more unit. The taking of turns, then, depends on both speakers and listeners recognising turn-constructional units and smooth speaker exchanges require conversationalists to predict when the current unit will be completed.

Participants must use intonational cues and a knowledge of the language to decide what are possible completion points in a turn. Speakers may, in fact, continue to speak after a possible completion point, but in such a way that nothing will be lost if that speech is interrupted or ignored. One example of this type of post turn utterance is the tag-question (It would be a good idea to leave now, wouldn't it?).

One implication of this model is that, like in other economies, we need not expect equal distribution of the valued commodity. Those who are more powerful should be expected to speak more and this should be true not only in societies where there are strict rules about precedence in speech, but in any society where such a turn-management system operates and where the speaking turn is a sought after resource. This distribution of talk must, however, rely on a strong within-group recognition of relative power and willingness to manage the conversation accordingly. According to the Sacks et al rule system, if ‘current speaker selects next’ has not been used self selection may be instituted and the first person to start speaking acquires rights to the turn. Therefore, unless the selection of next speaker accounts for most turn exchanges, there is nothing to stop the powerless from claiming rights to the turn through speed.
The floor: Recognising the current speaker.
Sacks et al noted that 'overwhelmingly, one party talks at a time". Therefore the floor is 'held' by one person at a time. The one person floor is assumed in most studies of conversation management and interruption. Edelsky (1981), however found evidence for the existence of cooperatively constructed many-speaker turns. Edelsky looked at five informal university-based committee meetings. She found that in many episodes a single floor-holder could not be identified. When 'floor' and 'turn' were identified from participant sense two types of floor could be distinguished. These were a 'singly developed floor' which is the usual model for analysis and 'collaboratively developed floors'. There were two types of collaborative floors, the first a free-for-all, the second and more common type being when several people seemed to be 'on the same wavelength'. While the first type was characterised by joking, laughter and simultaneity, the second was characterised by more orderly speech, but still it was not possible to say that any one person had the floor.

This is worthy of mention because so far turn taking has been described as being a competitive activity. The floor is a sought after resource and the person who is in possession is not only entitled to speak, but may also select the next speaker. The case of many people sharing the floor to build a common turn is not allowable under these rules. Such shared floors may be seen as a complex example of back-channel responses, where utterances are presumed not to constitute a turn because their purpose is not to again the floor but to add to the current speaker's turn. However, in the case of collaboratively developed floors, none of the speakers can identify themselves as the 'current speaker'. Therefore, while the back-channel responses explanation fits the Sacks et al model, it does not really explain collaboratively developed floors.

Edelsky uses these findings to question the 'one-at-a-time' assumption which underlies, not only Sack et al's model but other studies of interaction as well (Goffman, 1971; Duncan, 1973; West, 1979; Aleguire, 1978; Mchoul, 1978) and to question the assumption that episodes where more than one person speak at a time are always instances of conversational breakdown (Goffman, 1967,
Duncan 1973; Mchoul 1978). The existence of collaboratively developed floors suggests, therefore, that conversationalists may be more flexible than expected in their management of turn distribution. It also calls into question the competitive aspect of turn allocation in the Sacks et al model. While the Edelsky study shows that the floor can be shared it is also possible, and seems intuitively reasonable, that there may be conversations where the floor is not sought eagerly by all parties. For example, a therapist-patient interaction, if it is not a monologue, may still be heavily biased toward the patient speaking and the therapist rarely wishing to have possession of the floor.

One final problem with the Sacks et al model is that it conjures up a vision of conversationalists listening to a speaker, not for the content of their utterances, but purely for any information which will predict a possible completion point and so give them a chance to claim their turn to talk. Although this may be the case in some situations (university tutorials, dinner parties and other groups where being noticed is important) it does not seem an adequate representation of everyday conversation.

Signals
In contrast to the Sacks et al model, psychological models tend to be based on non-verbal rather than verbal behaviour, looking at signals given by one participant to the other which either relinquish or keep the floor (Yngve, 1970; Kendon, 1967; Duncan, 1972; Duncan and Fiske, 1977). The signals are types of behaviour which are largely context-free, except that they only function as signals when used at certain points during the turn. Although that was not their intention, these models can provide some back-up to the Sacks et al model by providing mechanisms which allow a speaker more than one turn constructional unit per turn and which give a listener clues as to what is a possible completion point and what is not. For example, Sacks et al suggest that intonation may be a cue as to whether a word is a complete one word utterance, or the beginning of a longer unit. The psychological models set out to objectify and quantify such non-verbal cues.
Early studies of turn-taking took what Beattie (1983) characterises as the 'traffic signal approach' (p85). Like traffic lights these signals had moral force and could be universally recognised. If the turn-yielding signal was 'on' an exchange could and should take place, if it was 'off' the current speaker should be allowed to carry on. Kendon (1967) looked at speaker gaze and found that if an utterance terminated with speaker gaze a smooth exchange was more likely to take place than if it did not. Beattie (1983) points out, however that 29.3% of the smooth exchanges in the sample took place without speaker gaze at the end of the previous utterance. A number of studies which looked at the effect on conversations where this particular signal was not available, i.e. no-vision situations, found that conversations were not impaired (Jaffe and Feldstein, 1970; Cook and Lalljee, 1972; Butterworth et al, 1977; Kasl and Mahl, 1965; Beattie and Barnard, 1979).

It is always possible that, while speaker gaze may function as an important turn signal, it is not the only choice. If this is the case then other signals could be used as substitutes when vision and therefore gaze, is not possible. This approach has been taken by Duncan (Duncan 1972; Duncan and Fiske 1977). Here a number of behaviours may be used as the 'speaker turn signal'.

1 an intonation pattern other than /22/, i.e. rising or falling pitch
2 a sociocentric sequence
3 completion of a grammatical clause
4 drawl on a final syllable
5 termination of gesticulation or relaxation of the hand

From Duncan and Fiske, 1977, pp169-189

The use of these signals and the appropriate response are governed by rules. Both parties are bound by these rules.

"the auditor may claim the speaking turn during the active period of the turn signal... In proper operation of the turn system, if the auditor so claims the turn in response to the signal, the speaker is obliged to relinquish immediately his (or her) claim to the turn. When the signal is not active, auditor claims of the turn are appropriate..."
The gesticulation signal, on the other hand "serves to inhibit any turn signal concurrently being displayed" (Duncan and Fiske, 1977, p189). However, the signals are conventions and must be agreed upon by both parties in order to have any function. Duncan et al (1977) considered that the generality of the actual behaviours employed was a question for empirical verification. Presumably any behaviours would do, if they were recognised as signals by both parties.

Duncan's studies have been criticised both because they do not consider the relative importance of each of the cues and on methodological grounds (Beattie, 1981b, 1983). Duncan proposed that the number of turn-signals was linearly related to the probability of smooth speaker switch taking place. Beattie (1983) having questioned the statistical analysis on which this finding was based, replicated the Duncan 1972 study and showed that while the cues identified by Duncan were indeed important in speaker exchange, they operated not independently, but in special combinations which identified possible turn transition points. The dominant signal appeared to be syntactic completion and associated intonational cues, as was suggested by Sacks et al.

It would seem then that Duncan, approaching the problem from a different angle, has identified the type of cues which could be used to identify the possible completion points of the Sacks et al model.

Beattie's own studies consider the work, other than managing turn-taking, which conversationalists also do. While a person is conversing they must prepare what they are about to say, both at a gross level where ideas and points are formulated and at the level of choosing the exact words to express their meaning. This planning and preparation may be evidenced in temporal cycles of hesitant and fluent speech (Beattie 1978b, Goldman-Eisler 1968). Beattie related the occurrence of both gaze (Beattie 1978a) and gesture (Butterworth and Beattie 1978) to hesitant and fluent phases in speech. He found that gaze is more common in fluent phases and gesture more common in hesitant phases. He therefore suggests that gestures, which may be related to the word which immediately follows the pause, give information to the
listener that the pause is being used for lexical search or other cognitive planning and should not be taken as the end of the turn. This could be the reason why gestures function as turn suppressing signals.

Conversely, speaker gaze may be taken as a signal that cognitive planning is not taking place. During fluent phases this information may not be useful, but during pauses it provides a signal that no more speech is being planned, that the speaker has therefore finished what they wish to say. This cue becomes even more powerful if the speech up to that point has been hesitant and characterised by low levels of speaker gaze. In these cases Beattie found that the single cue of speaker gaze, occurring at the end of an intonational contour had a dramatic effect on the smoothness of speaker switching (Beattie 1980b).

The point of this argument is to situate turn-taking mechanisms within a framework of conversation production. The number of signals to be processed and the cognitive and speech production workload will vary from time to time during conversation. The effect of any one signal will therefore depend on what else is going on at the same time, on whether that signal is noticeable in context. Turn-switching is not, therefore, independent of the rest of the conversation. It is context sensitive.

The Duncan signalling model and consequently Beattie's elaboration of it, place all responsibility for turn-taking with the speaker. As both the speaker turn signal and the turn suppression signal are given by the current speaker in a well regulated interaction it would be possible for the speaker to carry on for ever without the listener ever having a turn at talking. As Wiemann (1985) points out, the Sacks et al model relies more on mutual construction of the conversation, there are mechanisms for the listener to gain the floor. Also, participants are mutually responsible for the coherence of the conversation, as each utterance depends on preceding ones for its sense and relevance.
Resources

The resource model (Wilson et al 1984) combines elements from both the Sacks et al and the Duncan models. Turn taking follows the rules outlined in the Sacks et al model and non-verbal behaviours are used to dis-articulate transition relevance places. Therefore the options of current speaker selects next, first starter and so on are cycled through, but not necessarily at the end of each clause. The difference between the conceptualisation of behavioural cues in this model and in the signalling model is that the resource model does not consider specific behaviours necessarily to be cues, but rather inherently neutral resources that may be used as turn management signals depending on the context of the conversation. The concrete context of the conversation is therefore given a central role in any consideration of how the interaction might be managed.

As Wiemann (1985) points out, this view that conversational 'events' are neutral resources means that the same model can apply in sound-only situations, such as telephone conversations as in more usual situations. Indeed it should apply equally well in vision only interactions. The model would not predict an impairment in sound-only conversations, but would predict that other resources would be used to replace gaze where necessary. Support for this prediction was presented in an interesting study by Buzolich (1983) which looked at conversations between 'normal' speakers and 'augmented' speakers, people who used spelling boards or electronic voice simulators as prostheses because of speech dysfunctions brought about by cerebral palsy. The turn signals used were similar to those reported in Duncan and Fiske (1977), except that augmented speakers gazed towards their communication device when they wished to carry on speaking instead of simply avoiding gazing at the listener. The normal speakers also used gaze at the communication device, in their case as a turn yielding cue.

While Beattie points out the significance of the immediate cognitive context of the conversation, the resource model turns our attention to the wider context, both physical and social. In certain situations, physical constraints will play a central role in conversation; telephone conversations and speech
dysfunctions have already been mentioned. Other examples would be conversation in very noisy surroundings, or where the participants are engaged in a task outside the conversation. In ordinary conversations social constraints and expectations are likely to be much more powerful in shaping the form of the conversation. The resource model can therefore be used to study how the conversational events are used to build and to reinforce the relationship between the interactants. Examples of conversational events would be interruptions, time spent holding the floor and topic control.

**ACTION MANAGEMENT**

The second approach to conversational organisation is based on what the interactants are trying to accomplish in the conversation. This concept of 'doing things' with talk relies on the idea of speech acts, that is, units of action carried out in speech alone.

The idea of speech as a form of action was first put forward by Austin (1962). The traditional view of semantics considered sentences to have propositional meaning only. That is, utterances made assertions about the state of the world which could be compared to the world and evaluated in terms of their truth. Austin pointed out that there was also a second class of utterances which carried out actions, such as threatening, promising, demanding and so on. These two types of utterance were labelled *constative* and *performative* respectively. While Austin originally considered these to be distinct types of utterances, he later argued that all utterances have a constative content and a performative force. Performative aspects of utterances can be evaluated, not according to their truth, but according to their felicity or infelicity. This means that they are compared, not against the state of the world before the utterance, but against any changes in the world produced in consequence of the utterance.

Austin distinguished between *locutionary acts* which consist in the saying of an utterance, *illocutions*, which have their effect simply by being uttered and *perlocutions*, which may or may not have an effect when uttered. If a sentence contains the words "I promise that ..." then a promise has been
given, whether or not it is later carried out. On the other hand, if we wish to placate someone, it is not necessarily true that the words we use to do so will have any effect.

Searle (1969) suggested that speech acts can be defined by providing, for each act, necessary and sufficient conditions for the successful performance of the act. One such condition is that the speaker intends the hearer to recognise that s/he wishes to carry out a speech act and that the act therefore has illocutionary force. Searle also distinguished between two types of rule, constitutive and regulative which constrain these conditions. Constitutive rules take the forms $X$ counts as $Y$ and so define speech acts in terms of other acts or behaviours. Regulative rules take the form if $X$ do $Y$ and define the appropriate usage of the acts.

Speech act theory has had a profound influence on the study of verbal interaction, leading to two main strands of research. The first is the study of the comprehension and production of speech acts, particularly indirect speech acts. Much work has been directed to the question of how listeners understand that assertions such as "It's a bit cold in here" or questions "Were you born in a barn?" actually function as requests for the door to be shut. Studies of the production of indirect speech acts have looked at the circumstances in which indirect speech is preferred to direct speech acts, often because of politeness (Winterhoff-Spurk, Herrmann and Weindrich, 1986).

The second strand of research influenced by speech act theory is potentially more important for social psychology. This is research which studies speech as social action. Clarke (1983) describes conversation as "a conveniently circumscribed 'test-case' for a general theory of action" p3. This emphasis on an action component of spoken interaction has led to analysis of conversation which stresses the action intended in each utterance, rather than the linguistic structure or the relationship which the utterance implies exists between speaker and hearer. This interest in action, intention and the implied goals of communication can be linked to actions theory (vonCranach
and Harré, 1982), although von Cranach's definition of goal directed action is rather more rigorous than that normally used.

This view of conversation emphasises that the participants have conversational goals and that their speech can be viewed as a series of actions intended to bring about that goal. The organisation of the conversation will therefore depend partly on how interactants go about achieving their goals, and partly on which actions are permissible in certain contexts. The overwhelming majority of emergency calls to the fire brigade have one explicit goal: to bring about the attendance of the fire brigade at an incident. According to the view of conversation as action, this goal should influence the structure of the conversation and the nature of the goals should be reflected both in the range of speech acts used and in the way they are used. For example, it would be expected that in these interactions, as in other where the basic communicative goals are cooperative rather than competitive, the use of threats and insults would be inappropriate and would run counter to the interactants' goals. The use of these acts should, therefore, be rare.

Attempts to find a grammar for speech acts, that is, a set of rules about which acts are appropriate in a given context, have had varying degrees of success (Clarke, 1983). It is known, however, that whether rule-bound or not, given any single act, there are other acts more likely to follow as next act than would be predicted by chance (Thomas, Roger and Bull, 1983).

INFORMATION MANAGEMENT
Information management has special significance in task-related conversation. While information is transmitted in all conversations, the significance of the information varies considerably according to the type of interaction. In purely social conversations, information plays a secondary role to the development of the relationship between interactants. The content of the information, which topics are raised and the accuracy of the transmission, are not of prime importance. Where the purpose of the conversation is to complete a task, information gains precedence over social relationships. Obviously, where the same interactants will speak to each
other many times, relationships are important. In the case where interactants expect to converse only once the relationship between them is almost irrelevant.

An important element in communicating information is that it should be understood. In fact, without understanding, information does not exist. Therefore, information must be given in a form suitable for comprehension by the receiver. Similarly, if information is to be elicited, that elicitation must be framed in such a way that its reference is comprehended. Put more formally,

"The degree of understanding potentially achieved in verbal exchanges is a direct function of the degree of convergence of the inter-actionally relevant concepts held by the interactors and their shared conventions for expressing them."

Kreckel (1981) p4

In other words, understanding depends on the convergence of the frameworks within which the two parties are operating. This is one step on from Kelly's Sociality Corollary where social involvement is based on 'the extent that one person construes the construction processes of another' (Kelly, 1965) as the suggestion is that the sharing of frameworks or conventions is necessary as well as understanding.

In a task oriented conversation the interactants are using the common framework of the task in hand. This should increase ease of communication. However, this framework will depend on each person's understanding of the task. If the two parties have a different concept of the task, communication may suffer.

Probably the simplest way of conceptualising a task is as a series of steps necessary to reach a goal. Different concepts of a task would therefore include different sets of steps. For those steps held in common communication would be easy, for those steps held by only one person communication would be difficult.
Viewing tasks as a series of steps has some similarities with the idea of scripts and plans (Schank and Abelson, 1977), developed in artificial intelligence to model human cognitive processing. Scripts are held in memory and contain information about familiar situations or activities, for example getting to work, going to the cinema, supermarket shopping. Scripts are built up through the experience of consistencies in frequently encountered situations. Thus a supermarket script might include driving to the car park, parking, entering the supermarket, collection of a trolley and so on. Scripts can be individual just as experiences are, but because a common culture leads to a number of common experiences, there are a number of scripts held in common across a culture. One such script would be making a telephone call: dial the number, someone answers, announce yourself, converse, say goodbye, put down the receiver.

Scripts are only suitable for some occasions. Where scripts do not apply, or where they do not contain enough information, planning structures are used. These are more general and apply to a number of situations. A shopper, following a supermarket script, may discover that there are no trolleys available. S/he could simply stop and wait until one turns up. More likely, s/he will either search for a trolley (outside the store, in the car park, near the cash desks) or substitute a basket. Searching and substitution would also work in situations other than a supermarket.

Of more relevance to conversation management is the suggestion by Lehnert (1977) that 'scriptal world knowledge' is used to generate inferences about the intent of a question which are necessary to enable an answer to the question to be generated. For example, if a customer asks a British Rail guard the question "Can I get a train to Waterloo from here?", the guard must infer that this is not a pure information question requiring a yes or no answer. S/he must infer that the passenger wants to get to Waterloo and that the answer to the question should contain this information. If this model of question answering is correct, questions which address parts of a script should be easier to answer than those "off" the script.
Although scripts were originally proposed to refer to frequently encountered situations it is possible that people may have outline scripts for situations they have not encountered themselves, but which are well represented in their culture. Examples of such situations might be court-room trials, nuclear attack, being arrested and, possibly, making a 999 call. As these outline scripts are not based on personal experience they may be fragmentary, simple, even inappropriate. Their existence would mean that some events in these situations would be expected, allowing inferences to be drawn from 'scriptal world knowledge', while some events would be unexpected and would need to be dealt with in a different way.

The inference to be drawn from this discussion of communication and scripts is simply that all information is not the same and therefore may not be treated in the same way. Particularly, expected and unexpected information may need to be handled in quite different ways.

Each of the three types of conversational management has different implications for the study of control. Of the three, the most extensive literature concerns turn management and, in particular, issues of control and dominance in turn management. These will now be discussed.

**TURN MANAGEMENT AND CONTROL**

In fact, most studies of interaction consider control in the sense of dominance. An interactant can be considered dominant for three reasons; dominance can be a personality trait, with the personality of the speaker affecting their speech style; dominance can be a concomitant of status, and third dominance can come about because of the roles the interactants have. In all these cases dominance is used rather than control, because the implication is that the control exerted, by the person of higher status, will be toward that person producing more than their fair share of the conversation either in speech or in topics.
Because of the extent of work done in this area these three aspects of dominance will be considered in turn.

**Dominance as a trait or socio-sexual attribute**

Dominance can be seen as a measurable personality trait, independent of a person’s status. The research can then look at the correlates of this trait in interactive behaviours. One such correlate is the relative amount of time spent talking or holding the floor. The hypothesis is that more dominant individuals will take up more of the available interaction space. A corollary of this hypothesis is that more dominant speakers will interrupt their partner more as a strategy to gain control of the floor.

Farina (1960) used interactive behaviours as indices of dominance in order to produce measures of personality dominance which could be assessed unobtrusively in a clinical setting. The aim of this study was to examine the relationship between the sex of the dominant parent in a family and the pre-morbid adjustment of a schizophrenic son. Theory suggested that patients who showed poor pre-morbid adjustment came from mother dominated families.

Seven measures of interactive dominance were used; speaks first, speaks last, the total of speaking first and last, passive acceptance of solutions, total time speaking, how much a parent yielded from their most extreme solution and how much a parent yielded from their least extreme solution. For each of these indices a significant difference was found between parents of good and poor patients, though no significant differences were found between the parents of poor patients and a control group of parents of tuberculosis patients. Farina included simultaneous speech and interruptions as a measure of conflict rather than dominance. While there were no significant differences in the frequency of simultaneous speech, the parents of schizophrenic patients and particularly poor pre-morbid patients used more interruptions than the control sample.
It seems therefore that measures such as the time spent speaking and interruptions can be used as measures of dominance or conflict. However, the personality dominance of the interactants was not assessed. The relationship between personality measures and behavioural measures of dominance tend to be studied in laboratory settings.

Rogers and Jones (1975) paired a high dominance S with a low dominance S, as measured on Likert-type scales adapted from the Cattell personality inventory, (Cattell and Stice, 1962) producing 18 dyads. The dyads were then given 15 minutes to complete a cooperative problem-solving task, discussing a campus problem and producing a solution. The dialogue was scored for the length of time each interactant was the sole speaker and for the number of instances of simultaneous speech, not including anything which could be counted as 'back-channel responses' or 'listener behaviours'. Those with higher dominance scores held the floor more and attempted more interruptions than their low dominance partners. However, both high and low dominance speakers tended to give in when they were interrupted, although there was a non-significant tendency for high dominance speakers to have more successful interruptions. Therefore, although the high dominance parties held the floor more, they presumably used strategies other than interruption to do so. Since the number of turns in an interaction is always the same for both parties, high dominance Ss must have had longer turns at speaking. As there is no comparison set of equally matched pairs it is impossible to tell whether this was achieved by retaining the floor, regaining the floor after a short turn by the low dominance party or by a combination of both.

It would appear, therefore that while personality dominance may be related to the length of time spent speaking, a simple measure of interruption may not. Ferguson (1977) addressed the issue of whether all types of interruptions were equally dominant. Four distinct types of interruption were identified: simple interruptions where there is simultaneous speech and the first speaker does not complete their utterance; overlaps which have simultaneous speech but the first speaker completes their utterance; butting-in interruptions where
there is simultaneous speech but the interrupter does not gain the floor and silent interruptions where there is no simultaneous speech and the first speaker does not complete their utterance. Ferguson used both self rated measures of dominance, The Personal Style questionnaire, (C Brand, 1972) which uses items from Catell's 16 PF (Cattell and Stice, 1962) and a rating, from 0 to 9 of the partner's dominance, bossiness and aggressiveness in conversations. Only overlaps and silent interruptions correlated significantly with the dominance measures, with overlaps correlated to the personality questionnaire measure and silent interruptions correlating with ratings of dominance. Supportive evidence comes from a study of university tutorial groups (Beattie, 1981a). Here dominance was, however, seen as an outcome of the role of the participants rather than of personality traits. Although students interrupted tutors more frequently than tutors did students, students used simple interruptions and tutors used overlaps. Beattie suggests that students interrupt both the tutor and other students because it would be difficult otherwise to gain the floor. Even so, students use a form of interruption which may seem intuitively to be dominant, but which Ferguson found was not related to independent dominance measures, while tutors use one of Ferguson's dominant types, overlapping interruptions. As Beattie (1983) points out, overlaps have the effect of not allowing the student to come to their own conclusion, as this is provided by the tutor.

One problem with the coding of silent interruptions and overlaps is that the assumption must be made that the speaker intended finishing his utterance in the first case, and intended to carry on after the next transition relevance place in the second. As spoken dialogue is inherently ungrammatical it is difficult to justify an assumption that a person starting a sentence intends to continue speaking until completion, or that the intention is sustained throughout their turn. If one speaker trails off during his turn, ending mid clause but with an unfilled pause, the turn would normally pass to his partner without the participants feeling that this constituted an interruption. Similarly an overlap is only an interruption if the speaker is not allowed to complete his point (Murray 1985).
Chapter 2

Sex, dominance, power and control
While status can be conferred because of role, as in the example of tutors vs students, relative status may also depend on certain personal attributes such as sex, skin colour, social class, immigrant status or education. Men are considered higher status than women, whites than coloureds and so on. We may expect that this status, or potential dominance will be reflected in interactions between members of high and low status groups.

The example of sex differences is interesting because interational inequalities may be due both to the relative positions of men and women in society and to the fact that the personality traits of dominance and aggression are at least more acceptable in men if not more prevalent. The debate about whether personality differences in the sexes are due to biology or to upbringing is not relevant in the present context and will not be pursued here. However, if one sex is assumed to be naturally more dominant and also to be of higher status, then the likelihood of that sex using more dominant interactional behaviours is increased.

Interactional space
Early research into sex differences concentrated on exploding myths and providing simple examples of male dominance in conversation. One such example was the distribution of speech in cross-sex conversations. A number of studies, not all carried out by feminists, showed that men spoke more than women in mixed conversations (Argyle, Lalljee and Cook, 1968; Bernard, 1972; Duncan and Fiske, 1977; Eakins and Eakins, 1976; Kenkel, 1963; Strodtbeck, 1975, Strodtbeck and Mann, 1956; Strodtbeck, James and Hawkins, 1956, Swacker, 1976). This taking up of more conversational space can be seen as the verbal equivalent of men's tendency to take up more physical space by adopting open postures (elbows out, knees out, legs stretched) whereas women display more closed postures with limbs close together and arms close to the body (Peterson, 1975; Wex, 1979).

Taking up more space, verbally or physically, may be seen as an expression of male dominance. However, no difference in amount of talk has been found
in some studies (Hirschman, 1973, 1974; Shaw and Sadler, 1965). Jose, Crosby and Wong-McCarthy (1980) found no relationship between amount of talk and sex role as measured on the Bem Sex Roles Inventory. Sex may interact with other aspects of the conversational situation. For example, Hershey and Werner (1975) found that feminist wives talked more than their husbands, whereas non-feminist wives spoke less. Leet-Pellegrini (1980) found an interaction between sex and expertise with women experts relying on solidarity and male experts on power. She found that male experts talked more than female experts. Askinsas (1971) found that women talked more than men in groups from mixed sex housing, but not in groups from single sex housing.

**Interruptions**

The situation with regard to interruptions is even more complex. A number of studies have found that males interrupt females more than vice versa (Argyle, Lalljee and Cook, 1968; Eakins and Eakins, 1976; Esposito, 1979; McMillan, Clifton, McGrath and Gale, 1977; Natale, Entin and Jaffe, 1979; Octigan and Niederman, 1979; West, 1979; Willis and Williams, 1976; and Zimmerman and West, 1975). Zimmerman and West (1975) covertly recorded 31 two-party conversations in public places. They found that in mixed-sex conversations men initiated 96% of all interruptions. This finding was corroborated in a laboratory study of 5 mixed-sex dyads (West, 1979) where 75% of deep interruptions were initiated by men. Deep interruptions were defined as those occurring "more than two syllables away from a terminal boundary of a possible completion point" (p82), so as to distinguish between errors in the timing of speaker switch and intentional interruption. In this study the responses of conversationalists to interruption were also studied and it was found that while both men and women tended to yield the floor when interrupted the tendency to do so was less pronounced for women, suggesting that women do not 'invite' interruption by their tolerance.

Grief (1980) found that fathers were more likely than mothers to interrupt and engage in simultaneous speech with their children and both parents were
more likely to interrupt their daughters, although there were no differences in the children's use of interruption.

West and Zimmerman (1977) found that in a doctor's surgery, with doctor, mother and child present, 86% of all interruptions were by an adult. West compares this finding with the previous study of male-female interruption. She claims that interruptions are dominant in three ways. Firstly, the interruptions tend to occur when the woman or child is engaged in potentially problematic behaviour, refusing to have injections in the case of adult-child interaction or leafing through the man's notebook in adult-adult conversation. Secondly, interruptions can be used to manage the conversation. Thirdly, they constitute a display of dominance, both to the interactant and to any third-party witnesses. While interesting, these claims are based, as West admits, on suggestive findings from very small samples (five interactions in the case of the adult-child study).

Jose, Crosby and Wong-McCarthy (1980), Beattie (1981a) Rogers and Jones (1975) and Roger and Schumacher (1983) found no sex differences in interruptions.

Hirschman (1973) in a parallel to Edelsky's (1981) finding of the multi-party floor found that in a small sample of dyads, two women interrupted each other more than any other pair and that these interruptions tended to be elaborations of the others utterance. Ofshe (1981) found that all-female groups generated much higher rates of simultaneous speech, particularly during social activity rather than task-based activity. Shaw and Sadler (1965), studying heterosexual couples found that women interrupted their partners more than did men.

It is possible that the sex of the speaker is not the only or the most important factor in the use of interruptions. Courtright, Millar and Rogers-Millar (1979) found that in married couples the more domineering the spouse the more they interrupted their partner, irrespective of sex. Hoffman (1980) found that the sex of the person spoken to was more important than the sex of the
speaker. Kennedy (1980) found that while women were interrupted more than men, they also did more interrupting. Winter, Ferreira and Bowers (1973) found that married couples used more intrusive interruptions than did unrelated cross-sex couples.

These findings may seem to negate the male dominance through interruptions hypothesis. However, an analysis of the function of interruptions shows that not all interruptions are aggressive. Interruptions may be used to support the speaker or to show enthusiastic agreement (Aleguiure, 1978). Kennedy and Camden (1983) looked at interruptions in mixed-sex graduate student groups at one of their regular meetings. They found that over half of the interruptions could be classified as supportive. Willis and Williams (1976) found that female speakers were more likely to show agreement than males.

It can be seen therefore that interruptions can be used in a dominant or controlling way, but need not be. If interruptions are seen as neutral conversational events (Wiemann, 1985) rather than mini-dominance battles (Meltzer, Morris and Hayes, 1971) then this disparity in findings is more readily explained. Interruptions can be used to control interaction and to gain the speaking turn but can also be used in a supportive or even a cooperative manner (Edelsky, 1981). As a method to chose for dominance battles interruptions are relatively crude and indeed would be considered ill-mannered in this culture. They are not, however, the only resource available to interactants and the assumption cannot be made that interruptions will be used in isolation. In the case of emergency calls interruptions might be used by the operator or by males whether they are callers or operators. However, as noise may already present a problem on a telephone line, it is possible that interruption, or at least simultaneous speech, may not be appropriate in that situation.

SPEECH ACTS AND CONTROL
A second method of controlling conversation is to structure the interaction using speech acts, that is, by the style in which the content of the speech is
presented. The term speech act is used loosely here to cover the content analysis of talk where categories are based on what the speaker is doing with speech rather than on the subject matter or the referent. One such content analysis scheme, Conversational Exchange Analysis (CEA) developed by (Thomas, Bull and Roger, 1982) has been used to identify strategies which may be used either to retain the floor or to retain the role of listener. CEA concentrates on the exchange of information in an interaction and categorises speech on three distinct levels 1) activity, how the information is made salient, 2) type, the sort of information exchanged and 3) focus, the referent of the information. The first level of activity is most similar to the concept of speech acts and is the level most relevant to this discussion. The activity level includes such categories as Offer, Reply, Request and Dissent. Using a Markov chain analysis of conversation from 24 pairs of female undergraduates the functions of speech acts in retaining and relinquishing the floor were examined (Thomas, Roger and Bull, 1983). It was found that Offer, Reply and Dissent tended to perpetuate themselves, thereby retaining speaker control of the floor. Consent, Reaction and Request tended to relinquish the turn. Strategies for retaining or relinquishing the floor could therefore be identified. In order to retain the floor a speaker could use Offer as their first act within that turn. The use of consent as first act would tend to return the floor to the original speaker, but it was possible to use an Offer as a second act immediately after Consent and thereby retain the turn.

Mischler (1975) in a study of teacher - pupil interaction identified three types of discourse initiated by and sustained through questions. These were: chaining, which describes a question - answer - question - answer sequence, with the same speaker asking all the questions; arching, where the respondent to a question also asks a question and embedding, where there are two responses to the initial question. Mischler found that in adult - child conversations the adults tended to retain control of the conversation by using chaining if they initiated the question or arching if the initial question came from the child. He suggested that this use of speech act chains embodied the authority relationship which exists between adults and children, particularly in the classroom.
Speech acts can therefore be used to influence turn-switching turn by turn. The usage of speech acts will, however, vary across interactional episodes. In an interview or an interaction structured like an interview, questions will be used predominantly by one party. West (1983) found that of the 773 questions asked in 21 doctor-patient interactions 91% were initiated by the doctor. Furthermore, patients answered 98% of questions asked by doctors while doctors answered only 87% of those asked by the patient. Therefore, as the doctor has the more dominant role, although a question could still act to change speaker, this does not mean that this act shows a low level of control. Rather the use of this act serves to define the difference in roles of the two participants and the nature of the interaction. It would commonly be accepted that a social conversation structured around questions from one party only would be unsustainable. This point is important as the emergency calls to be studied here have many of the characteristics of an interview. Their main purpose is the transfer of information in one direction.

INFORMATION MANAGEMENT AND CONTROL
As outlined previously, information management implies that different types of information will be dealt with, or managed, differently. There is evidence that this is the case at least at the super-ordinate level of the topic.

Stiles, Orth, Schelwitz, Henrikus and Valbona (1984) studied exchanges between patients and doctors using a taxonomy of verbal response modes (Stiles, 1978). Factor analysis of the verbal response modes used by doctors and patients was used to identify verbal exchanges, or clusters of verbal response modes. The incidence of these verbal exchanges differed across the three sections of the medical interview: history taking, physical examination and conclusion. These differences related to the function of each section of the interview. In the history taking section doctors gathered information from patients, as would be expected. They also gave the patient information in explanation exchanges. During the physical examination the doctor directed the patient while continuing to gather information. In the final section the doctor continued to gather information while also giving the
patient information and issuing instructions. While these descriptions have been given in terms of the doctor's speech only, each of the verbal exchanges also involved the patient.

Interestingly, while the types of exchange varied across the sections of the interview they were consistent across individuals and across the two settings of initial and follow-up interviews. This suggests that the participants were constrained by their role.

A previous study by Stiles, Putnam, James and Wolf (1979) identified different types of verbal exchange, but again there were differences reflecting the function of the three sections of the interview.

Further evidence for different management for different topics comes from Bales and Strodtbeck's (1951) study of group problem solving. Bales hypothesised that problem solving involved three phases; orientation, evaluation and control. Furthermore, the use of both positive and negative reactions would differ across these three phases. It was found that negative reactions increased as time progressed with increasing control, while positive reactions increased at the end of the problem solving session, as the group confirmed its agreement.

Again the different functions of the task were managed differently.

The management of information will be studied in more detail in the case of 999 calls than in these examples. While the studies quoted above dealt with different types of information in a general sense, specific items of information will be looked at in the much shorter conversations typical of emergency calls.

**SUMMARY**

In this chapter we have seen that control is one of the two important dimensions for ordering both interpersonal relations and situations. In task-oriented conversations and in telephone calls the importance of this
dimension is increased and the importance of the second dimension, affiliation, is decreased.

Theories of turn management address the problem of how interactants interweave their speech patterns with few instances of overlap or silence. While many theories consider interruptions to be a breakdown in this system, or at least breaking the rules of the system, the resource model (Wilson et al 1984) suggests that such interactional events are neutral. The links between interruptions and the proportion of speech produced by each interactant have been linked to control and dominance. From Sacks et al (1974) on, the 'floor' has been considered as a sought-after resource. Therefore, unequal distribution of speech is taken as indicative of dominance. The relationship between interruptions and dominance is less clear, particularly as the use of interruptions seems to depend to some extent on the social situation. This ambiguity can be taken as evidence for resource theory, as interruptions may serve different functions in different settings and with different interactants.

The second aspect of management to be considered views speech as action (Austin, 1962). Speech acts are a tool for conversation management because their use may constrain the actions of an interaction partner. Just as certain physical actions can place an obligation on a second person to act in a certain way (extending a hand in welcome) so speech acts can oblige the receiver to reciprocate (spoken greeting). As well as simply constraining the actions of another, speech acts can be used as a display of authority (Mischler, 1975; West, 1983).

Information management, the third aspect to be studied, is concerned with the prerequisites for efficient information transfer. In order for information to be communicated, both parties must have a common conceptual framework. Communication of routing information may be made easier by the existence of scripts (Schank and Abelson, 1977) which contain that information, particularly if the script is one held in common by members of a culture. Different types of information, whether or not they are part of a
script, may be handled differently. The example given above is of the
differences across the three sections of a medical interview (Stiles et al, 1984).

These three aspects of conversational management will be examined in the
specific case of fire alarm calls. This examination will seek to link some of the
variables or conversational events mentioned above to the attempts of the
operator or caller to manage the conversation. Turn management will be
studied with reference to the use of interruptions and the distribution of
interactional space. The use of speech acts, both in terms of frequency and
sequence will be compared for operators and callers. Lastly, information
management will be studied with reference to the specific pieces of
information which need to be dealt with in emergency calls to the fire
brigade.

Before moving on to study these calls in detail, however, the next chapter
will outline what is already known about conversations with some of the
same characteristics.
CHAPTER 3  TELEPHONE CONVERSATIONS

Many of the studies cited in the previous chapters are based on interactions carried out in an experimental situation, particularly those which are more psychological (for example Thomas, Bull and Roger, 1982) than sociological (for example West, 1983). This has the advantage that the conversations can be controlled in some respects. For instance, duration and subject matter give increased comparability across the sample, the technical quality of recording equipment can also be improved. There are, however, several disadvantages to this type of study. However informal the surroundings, the conversations are contrived rather than natural and generalisations of the results must be based on the assumption that the interactants behave in the same way when conversing of their own accord.

Also, the purpose of the conversation is to provide data for the experimenter and the interactants know this, even if they do not know that it is the conversation itself which is being studied. Subjects are often asked to get acquainted or given a discussion task, which in itself may affect the interaction.

A study by Rutter et al (1984) used the subject of abortion as a topic for discussion by subjects. The experiment was designed to study the effects of the loss of visual cues on the content and style of conversation, the prediction being that cuelessness would lead to more task-orientation. The reverse was found. The explanation for this reversal was taken to be that with such a personal topic the barriers between the person and the task break down, so that to be more personal is to be more task oriented. It is apparent from this study that the topic given to interactants can affect the conversation they will have.

A third disadvantage is that the impact of the conversational context is lost or diminished. This is partly because the basic social parameters of the interaction are defined by the experimenter, that is, whether the interaction is purely social, problem solving, competitive or cooperative. The social context
is therefore set in advance rather than emerging from the interaction. Secondly, part of the purpose of conducting experiments in a laboratory is to control for aspects of the physical environment which make up the context of real conversations. In the case of telephone calls the aspects of the physical context which may have the most obvious effects on the interaction are those which add noise to the communication channel: a poor telephone line or traffic passing outside a kiosk. The part that such real world events may play in structuring natural conversations is therefore lost in laboratory settings.

Therefore, in experimental situations, the purpose is external to the interaction and the aims of the subjects are largely irrelevant. In contrast the timing, content and direction of natural conversations are determined by the interactants. They take part in the interaction because they have a wish or need to do so. This is not to say that findings from laboratory based studies cannot be replicated in naturally occurring conversation, as has been shown by Rutter (1987).

The alternative approach, using naturally occurring conversation also poses certain problems, one of which is how to obtain recordings of the conversations ethically. Interactions which would normally take place with or without the experimenters' intervention can be taped for the purposes of analysis (see for example Beattie 1981a and Rutter 1984, both of whom used university tutorials). A possible problem with the approach is that the participants may feel that they are on show, particularly if video is used, and they may react to this perception. Although behaviours out of conscious control are unlikely to be affected (Wiemann, 1981) there is always the possibility that the participants, particularly in a situation where they may already feel on show because of the situation, may feel an increased need to show that they are in control. Whether or not this is a problem would depend on the subject of the study.

Other researchers used 'eavesdropping' techniques taping conversations which take place around them (Zimmerman and West, 1975). If possible the interactants may be asked afterwards for permission to use the recording. In
these cases the interactants will be un-selfconscious and natural. However, the researcher has no control over the length or subject matter of the conversation. Furthermore, interactants may refuse permission if they have been discussing intimate topics. Again, this would only be a problem with studies where it was desirable to collect data from a full range of conversational situations, including intimate situations.

A third possibility is to use conversations which are recorded in the normal course of events, with or without the interactants' knowledge. Both Beattie (1980a) and Bull (1986) have studied video recordings of politicians being interviewed on television. In this case the participants are aware that they are being recorded and are therefore involved in active self-presentation. As it was this self-presentation which was the subject of both studies, this was not a problem.

Beattie and Bernard (1979) used recordings of directory enquiry calls. These are naturally occurring calls from the public and the callers were not aware of the recording.

An unusual example of this approach of using conversations recorded for another reason was the study by Wilson and Williams (1977) of the Watergate tapes. As a corpus of data these recordings had the additional advantage of being conducted both face-to-face and over the telephone, allowing comparisons to be made of the conversation of the same people in both conditions.

The conversations studied in the present case are naturally occurring events and are normally recorded, although with the knowledge of only one participant. All calls taken at the fire brigade control room were recorded as a matter of course, the only change to this routine was that tapes were replaced rather than being turned over. It is unlikely, therefore, that the operators were unduly influenced by the fact that they were being taped. On the positive side, therefore, the interactions are purposeful and important to the interactants. Since all of the calls have the same purpose, to secure the
attendance of the fire brigade at an incident, there is also a degree of
comparability across the sample. The disadvantages of the approach are that
not only is the sample beyond the control of the researcher but the calls are (of
necessity) short and of varying lengths. One more practical disadvantage is
that the quality of the recording depends on equipment available at the site. It
was not possible to use separate channels for each speaker when collecting
recordings of calls for this study. This meant that speech was sometimes
indecipherable, particularly during episodes of simultaneous speech.

Since unconscious behaviour is unlikely to be affected by the speakers being
aware of the recording, the most important aspect of naturally occurring
conversation is that it is constructed to fit the interactants' own purpose
rather than that of the experimenter. This is particularly important in
applied research. Even in role playing exercises, where subjects may be acting
to the same purposes as a real conversation, the interactants do not bring to
the conversations the past experiences which may play a part in shaping a
natural conversation.

There are three salient aspects to these conversations; they are naturally
occurring, they are carried out without visual cues and they are task-oriented.
The importance of studying naturally occurring conversations has already
been outlined. In the following sections the second and third aspects are
discussed.

CONVERSATION IN NO-VISION CONDITIONS
In most conversations the speakers are within sight of each other. They can
therefore augment what they say with visual cues such as eye-contact, facial
expressions, body movements and gestures. These cues can be used in both
the content and the style of the conversation. In no-vision conversations
these cues are lost, although it is common knowledge that people will still
use gestures while speaking on the telephone.

It might be expected that the loss of these cues would disrupt conversation. If
gaze or eye-contact is crucial for to turn-taking this would imply that the loss
of eye-contact would lead to conversations with more interruptions and longer lapses between speakers (Kendon, 1967; Duncan and Fiske, 1977). This does not appear to be the case, at least as far as turn management is concerned. Beattie and Barnard (1979) have shown that telephone conversations tend to have fewer interruptions than face-to-face conversations rather than more. Rutter et al (1977) showed, by a re-analysis of published data, that eye-contact is not purposeful, but occurs because interactants tend to look at each other from time to time. On some of these occasions, both interactants will look at the same time simply by chance. The loss of eye-contact should not, therefore, disrupt conversation. However, other visual cues do seem to be important as the loss of cues does effect conversational style. The outcome of debates in no-vision conditions is less moderate, showing a greater concentration on the arguments put forward than on interpersonal issues (Morlay and Stephenson, 1977). Conversations in audio channels only are more depersonalised, task-oriented and to the point (Stephenson, Ayling and Rutter, 1976). The conversations are less spontaneous with fewer interruptions, probably because the interactants need to take more care to avoid conversational breakdown because of the absence of visual signals (Rutter and Stephenson, 1977). Cuelessness is also associated with more utterances ending with questions (Rutter, Stephenson and Dewey, 1981).

Rutter (1984) compared Open University tutorials carried out either face-to-face or over a multi-way telephone link. Measures of the content, style and outcome of the conversations were taken. The aim of the study was to replicate previous findings from the experiments cited above in natural conversations. The telephone tutorials were more formal, more task-oriented and less spontaneous. Furthermore, Rutter found that the behaviour of tutors and students was more differentiated and stereotyped in the telephone tutorials. Tutors sought explanation and information more by telephone, while students replied more, suggesting question - answer sequences. Furthermore, tutors increased their use of acknowledgement in telephone conversations. Rutter explained the difference between face-to-face and telephone by positing a mediating variable psychological distance which can be influenced by a variety of factors, only one of which is cuelessness.
Other factors which might effect psychological distance are the purpose of the interaction and the relationship of the participants.

**TASK ORIENTED CONVERSATION**

Earlier in this chapter the importance of the aims of the participants in a conversation was discussed. In fact, the aims of many conversations may be ill-defined; passing the time, social chit-chat and so on. In contrast emergency calls have a common, specific purpose; the caller wants help from the fire brigade and the operator needs to know what help, if any, is appropriate and where to send it. Furthermore, this aim has an inherent importance and urgency for both participants. The urgency may vary from incidents of a person trapped in a fire to a person trapped in a lift, but it is still a salient feature of the situation. Therefore there is little drive toward affiliation in these calls; both participants want to complete the call as quickly as possible. There is so little social interaction that these calls may not be considered by some to be examples of what is normally labelled conversation. As the calls are so task-oriented an increase in the importance of control over affiliation may be expected Smith (1985).

**SUMMARY**

Emergency calls may be expected to be purposive, as they take place to fulfil a real need for the participants. Their purpose is to perform a simple task, that of giving the fire brigade information about an emergency and providing the address of the incident in a form which the fire brigade can use to mobilise appliances. It should be noted that, while a caller may expect advice about what actions to take, operators do not give advice and generally limit assurance to a statement at the end of the call that the fire brigade is on its way. The conversations should revolve around this task partly because the interactants are strangers and so have no previous social links and partly because they take place over the telephone. While telephone conversations can be more intimate and personal than face-to-face conversations in some instances, the more usual reverse would be expected here. These calls should therefore be task oriented and be characterised by a non-spontaneous speech
style. Furthermore, because of the task-orientation, it is to be expected that there will be a marked differentiation of roles between operator and caller.

As the conversations are expected to be task-oriented and impersonal the importance of control over affiliation should be emphasised. Once again it should be said that the control referred to here is not necessarily dominance, but rather the tendency towards managing the flow of the conversation. Because of this emphasis on control these calls will be used to study the controlling strategies for interaction management. Three aspects of management will be considered; turn, action and information management.

Because one effect of cuelessness is increased emphasis on speaker roles, the affect of role differentiation on management strategies will also be examined. The difference in strategies by operators and callers will be studied as these are the two roles of professional and naive interactant. It is also possible that the sex of the speaker may affect the style of the interaction. Therefore, differences in male and female interactants will also be studied.

Different approaches are appropriate to the study of each of these three aspects. The overall plan of this study, therefore, is to examine each aspect separately before attempting to assess the relationships between them.

The first issue to be addressed does not concern any of these aspects directly, however, but deals with the context within which these conversations take place. As has been explained in chapter one, these calls deal with emergencies and time plays a critical role in the interaction. An important issue, therefore, is which kinds of interactional events militate against time efficiency. The first study will examine what types of problem occur in these calls and which are more serious in terms of time loss. The objective of this study is to provide some background regarding the kinds of difficulties which conversational management would seek to avoid.

The direct examination of interaction management will start with a study of turn-taking. The issues to be addressed here are whether behaviours
associated with dominance (amount of speech, interruptions, number of supportive or assent terms) are used for management. As it has been shown that men tend to display more dominant behaviours in mixed-sex pairs (Mulac, 1989) and that task related status can enhance this effect (Leet-Pellegrini, 1980), the behaviour of operators and callers in same-sex and mixed-sex conversations will be compared to see whether there is supportive evidence for these effects in the current corpus.

The second issue to be addressed is that of the usage of speech acts. The main question here is which speech acts, if any, are used to control the flow of the conversation. First the kinds of speech acts which are used in these conversations will be noted. Second, the usage of these acts will be examined in terms of their sequence to see whether the usage of certain acts by one party may influence the subsequent speech of the other party. The usage patterns of speech acts will be compared to those found by Thomas, Roger and Bull (1983) in an experimental context. As this experimental context called for discussion rather than information transfer, differences related to the conversation task may be expected.

The third aspect of conversational management, concerning the transmission of information, will be studied by examining the way in which different pieces of information are dealt with. From ‘script’ theory (Schank and Abelson, 1977; Lehnert, 1977) it is expected that where the caller can anticipate that certain information will be required, this information will be dealt with in a different manner from unexpected information.

Finally, behaviours studied in the context of turn-management and speech act usage will be taken as conversational events rather than as behaviour from two separate domains. Using multidimensional techniques the relationships between these events will be examined in terms of role, task and conversational management.
The tapping of the calls was made possible through previous contact between
the Fire Research Unit at the Department of Psychology, University of Surrey,
and the London Metropolitan Fire Brigade. Arrangements were made to tape
a sample of calls at the Croydon Control Room, one of three such control
units which served the district covered by the Metropolitan Fire Brigade.
Croydon control was responsible for the area of London south of the river
Thames. One hundred calls a day, on average were taken at Croydon. Since
the time of this study a single control room has been set up at the London
Fire Brigade headquarters. The equipment and procedures at the control
room have now changed. The description below refers to those current at the
time of the study.

Staffing
The control room was manned in four shifts. Each shift was staffed by nine
operators and four supervisors. There would always be at least six operators
in the control room at any time. Shifts were 8.30 AM to 5.30 PM and 5.30 PM
to 8.30 AM. Each operator took the day shift one day, the night shift the
following day and then had two days off. In times of emergency, such as
widespread flooding, an operator might get no breaks, even in the 15 hour
long night shift.

Control room procedure
All calls on the 999 emergency number are routed through the British
Telecom switchboard, where they are assigned priority. The operator asks for
the callers name and telephone number and for the service required. The call
is then passed on to the fire brigade control room. The British Telecom
operator may pass the caller's phone number on to the fire brigade operator
before she puts the caller through, in these cases the brigade operator will not
normally ask for this information again.
An incoming call was indicated by a light over an exchange line switch lighting up (fig 1a). There were six exchange lines to each work station and three overflow lines which the BT operator could dial direct. As the operator listened to the caller she entered the relevant information into a computerised system which controlled the relay to the fire brigade stations (fig 1b). A second operator could see what was being typed on the screen on a second VDU and heard the conversation on a linked set of headphones. This second operator searched through index cards which gave the predetermined attendances for each street or, in the case of long streets, each section, along with a list of the nearest fire stations which would be asked to attend. This card also gave a back-up list of stations and a list of stations in the vicinity which held special equipment. The operator typed onto the screen the time, the predetermined attendance, the attending station and a map reference. In order to locate the incident and decide on the level of attendance required the operator needed five pieces of information; the road name, the nearest side street, main road or vehicular access (often to pin-point part of a long street), the type of incident, whether there were people involved, and the caller's telephone number. This information was then sent to a station by pressing the appropriate key for that station on the console (fig 1c). The transmission of the message automatically started the alarm bell at the station. Non-urgent messages could be sent without the bell ringing. A copy of the message was
printed at the control room. Messages could also be transmitted by telephone and there was a back-up manual system for sounding the station bell in these cases.

A third operator took toggles denoting each pump or appliance mobilised and put them on a chart of Greater London together with the address of the incident. Any appliance not on this chart was available to be called out, even if it was not at its home station. The toggles for appliances not at the station were therefore marked with a coloured tag to denote the reason for their absence from the station.

The officer in attendance at the fire sent a message back to control as soon as s/he had assessed the severity of the incident. If no further help was required a 'stop' message was sent. If further pumps are required the message indicated the total number and type of pumps required, including those already in attendance (e.g. make pumps four).

The operator was also in touch with the other control rooms (at Stratford and Wembley) via radio. Although each area was self-sufficient to a large extent, help could be procured from neighbouring areas, especially to incidents near the boundary. This also applied to boundaries with the non-metropolitan fire brigades. The operator might need to do this to provide cover over all the area in the event of a major incident draining resources in one place. The operator would, in this case, move pumps from one station to another to even out the spread of resources.

Operators also received calls from within the fire service, both from fire officers attending incidents and from the stations and other control rooms, and routinely from the British Telecom operators to check that the lines were working.

The equipment used in control rooms placed some restrictions on the operator. While a message still appeared on the screen no new messages could be typed in. When an operator had a number of calls waiting they
tended to jot down the information onto paper while waiting for the screen to clear. This was not considered standard practice. Although this did not speed up the rate at which messages could be sent out to any great extent it did have two advantages; firstly, it helped to reduce distress in callers who would otherwise have to wait for some time before the operator replied and secondly, it allowed the operator to assess the urgency of all incoming calls and, if necessary, give some a higher priority. They could for example pick out a call to a house fire at a time of widespread flooding and deal with that first.

All calls to fire require attendance, even if the operator feels that the call is a hoax. The only category of calls where the operator may make a decision that attendance is not appropriate is special service calls, usually in cases of people who have locked themselves out, or animals stuck in trees. In these cases the caller is referred to the police, locksmiths, or the RSPCA as appropriate.

The supervisory staff at the London Metropolitan fire brigade were keen to emphasise the importance of control room work and of the efficiency with which it was carried out. The stress placed on operators during peak periods was emphasised, as was the fact that the workload was variable and unpredictable. Because of this stress control room staff tend to retire young, certainly before they reach 60 years of age.

Data collection
All incoming and outgoing calls were normally recorded in the control room, using a tape recorder linked to each operator station. Normally the tapes were wiped clean by re-recording when the tape was full. Arrangements were made with the control room staff to keep a continuous record of all calls for ten days, by replacing the tapes rather than over-recording. The start time and finishing time for each tape was noted.

The fire brigade also supplied Form 31B for each day that recordings were made. This form details the time each call was received, the address of the incident, the type of incident, the number of appliances attending and their
originating station and whether there was a report of people involved in the incident. Seven categories of incident are distinguished; fire, grass fire, rubbish fire, chimney fire, special services (eg road accidents, people trapped in lifts), false alarm with good intent and false alarm with malicious intent. Over the ten day recording period 850 calls were taped and identified. By cross reference to Form 31B the time, severity and nature of the incident was ascertained for 786 of these calls. Not all calls were suitable for analysis as some were incomplete. Originally 24 tapes were used and these were later supplemented with calls taken by male operators from a further seven tapes. This was because male operators were relatively rare. Only calls from the public were used. Calls from the police, from within the fire brigade and from automatic fire warning systems were discarded.

Table 1  Frequency of each type of call.

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<thead>
<tr>
<th>Type of incident</th>
<th>Frequency</th>
<th>%</th>
<th>Mean Time</th>
<th>St dev</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire</td>
<td>301</td>
<td>38.5</td>
<td>44.4</td>
<td>17.4</td>
<td>7-10</td>
</tr>
<tr>
<td>Special services</td>
<td>152</td>
<td>19.5</td>
<td>56.6</td>
<td>34.4</td>
<td>12-261</td>
</tr>
<tr>
<td>Rubbish fires</td>
<td>131</td>
<td>16.8</td>
<td>49.6</td>
<td>22.0</td>
<td>8-145</td>
</tr>
<tr>
<td>Malicious</td>
<td>105</td>
<td>13.4</td>
<td>58.4</td>
<td>44.3</td>
<td>12-327</td>
</tr>
<tr>
<td>Alarm caused</td>
<td>67</td>
<td>8.6</td>
<td>51.1</td>
<td>22.68</td>
<td>17-140</td>
</tr>
<tr>
<td>Grass fires</td>
<td>25</td>
<td>3.2</td>
<td>62.8</td>
<td>25.00</td>
<td>14-103</td>
</tr>
<tr>
<td>Chimney</td>
<td>5</td>
<td>0.6</td>
<td>45.4</td>
<td>12.11</td>
<td>31-62</td>
</tr>
<tr>
<td>Total</td>
<td>786</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The duration of the calls are shown in figures 1 and 2 below.

Table 2  Sample compared to distribution of calls received in 1983\(^1\).

<table>
<thead>
<tr>
<th>Type of incident</th>
<th>1983</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=107,266</td>
<td>N=786</td>
</tr>
<tr>
<td>Fires (including grass and rubbish)</td>
<td>46.8%</td>
<td>58.1%</td>
</tr>
<tr>
<td>Chimney</td>
<td>0.5%</td>
<td>0.6%</td>
</tr>
<tr>
<td>False alarm (good intent)</td>
<td>7.9%</td>
<td>8.5%</td>
</tr>
<tr>
<td>False alarm (malicious intent)</td>
<td>17.2%</td>
<td>13.4%</td>
</tr>
<tr>
<td>Special services</td>
<td>27.7%</td>
<td>19.3%</td>
</tr>
</tbody>
</table>

\(^1\)Figures supplied by the London Fire Brigade. Based on total calls for the London region in 1983
Malicious and special services calls are under-represented and fires, chimney fires and false alarms are over-represented in the taped sample. As the analysis concentrates on calls to fires this should not present a problem.

**Transcription**

The calls were transcribed verbatim. The following examples show the notation system used. Training in the transcription system was carried out on a separate sample of calls. Each call was given a reference number consisting of the tape number and the call number on that tape, separated by a slash, for example, call 16/7 is the seventh call on the sixteenth tape.

Simultaneous speech is indicated by underlining:

17 Operator ...... it's definitely Mitcham is it not
18 Caller Yeh it's Beddington Corner

Indecipherable speech is indicated by dashes enclosed in brackets:

23 Operator High how you spelling it
24 Caller (----------------------) trouble oh

Silent pauses are indicated using full stops. Each full stop represents approximately one second of silence:

12 Caller Ah . Mitcham

Very long gaps are given in words:

16 Caller Oh have they hang on (14 seconds) I didn't know if anyone had phoned

In some examples the full utterance is not given. In these cases there is a leading trail of full stops. These should not be confused with silence embedded in utterances:

17 Operator ...... it's definitely Mitcham is it not

Back-channel responses during short utterances are indicated by the listener response being given below a gap in the utterance. Where the utterance is too long for this approach to be practical, the back-channel speech is embedded in
Chapter 4

the utterance in brackets and the speaker of the back channel response is indicated:
12 Caller POR TH CAWE
13 Operator Yeh Yeh

2 Caller Ah good evening I'm a disabled matron living in sheltered accommodation (O-Yes) I can't get the warden and I've had a slight accident in the kitchen I've managed to put the fire blanket on it (O-Yeh) ah but I'd be happy if you could come out and look at it because there's forty-eight people in here

When a speaker raises their voice noticeably the speech is written in capital letters to indicate loudness:
29 Operator WHAT IS THE TELEPHONE NUMBER YOU ARE CALLING FROM
CHAPTER 5 A TYPOLOGY OF PROBLEMS

INTRODUCTION
It has already been stated that conversation management is important in 999 calls because the calls need to be efficient. Time is of prime importance in these calls. There is therefore a considerable incentive for both operator and caller to keep the conversation as short as possible. Any problems which occur in the calls will work against the aim of keeping time down. As a background to the study of management, an exploratory study was carried out to identify the types of problem with which the interactants may have to deal. This study further examined which problems tended to co-occur and whether some were more serious than others, that is, whether their incidence was associated with calls taking longer to complete.

It has been found that a sound only communication channel is as efficient as face-to-face for the transmission of purely verbal material, where efficiency is measured by both the accuracy of transmission and the time taken (Champness and Reid, 1970). Furthermore, sound only discussions of a problem are normally shorter than face-to-face discussions of the same problem (Davies, 1971a, 1971b; Short, Williams and Christie, 1976; Tysoe, 1984). As far as turn transition management is concerned, Beattie and Barnard (1979) found no evidence of telephone calls being adversely effected by the absence of visual cues. Beattie and Barnard compared the turn-switching patterns in 18 directory enquiry calls with those found in a previous study of face-to-face interaction (Beattie, 1978a). The proportion of speaker switches which involved simultaneous speech were, in fact, higher for face-to-face interactions than for the telephone calls. Also there was no difference between the two samples in the time delay involved in speaker switches. Therefore, telephone calls have been found to be as efficient as face-to-face conversations and to have smooth speaker switches.

Looking at the distribution of times taken for calls to fires (previous chapter) it can be seen that the majority of calls fall between 30 seconds and 1 minute in length. Since few calls fall below 30 seconds it must be assumed that this is
about the minimum time necessary to complete a call. In general then, these calls are short and efficient. There are two possible reasons for this, first that the calls are simple and straightforward with no potential for disruption, second that the calls are managed so as to minimise the effects of any disruption.

Although the task appears simple there is evidence that problems can and do occur in 999 calls. Eardley (1983) used the Critical Incidence Technique with fire brigade operators to identify problem themes in emergency calls. Eardley had operators discuss particular calls which had presented problems either to the respondent, or to another operator known to the respondent. Six problem themes were identified. These were stress, non-appreciation of centralised control, dialects/accents, interruption of call, non-appreciation of fire brigade procedures and, finally, strangers to the area. Eardley also interviewed members of the public and found that 25% of his respondents did not realise that they would speak to the GPO (now British Telecom) operator before being passed on to the fire brigade. Fifty-eight percent of respondents did not appreciate centralised control and a greater proportion of people who had not made a 999 call than of those who had, believed that they would be speaking to the local station.

The emphasis in Eardley's study was on the opinions and beliefs of operators and potential callers about interactions. The emphasis here is rather on the interaction itself. Therefore, the point of interest is whether problems manifest themselves in identifiable conversational episodes and whether they effect the efficiency of the interaction. For example, non-appreciation of centralised control emerged as an issue with both operators and callers. How might this lack of knowledge on the caller's part show up in the interaction? The implication is that the caller does not give address information in the form needed by the operator. The caller may use local landmarks rather than road names, for example. If the caller does this, will this merely cause irritation or does this lead to serious time wastage? Eardley does not say whether more than one problem could occur in one call. Do these problems tend to co-occur, or do some problems preclude the occurrence of others?
This study aims to identify inappropriate or problematic conversational behaviours and to examine the patterns of their occurrence. By logic, longer calls should have more problems than short calls, both because there is more time for problems to emerge and because there must be some reason for the calls to be unusually long. The longest calls in the corpus therefore seem the most fruitful sample to study in this context. The study starts with the least effective calls, by this definition, and seeks to identify inappropriate or problematic conversational behaviours. A typology of these problems is then produced using multidimensional scalogram analysis (Lingoes, 1973, Zvelun, 1978). Of particular interest is whether there are certain types of problems which have led to more time wastage than others.

**METHOD**
The 16 longest calls in the corpus were used and irregularities in them identified. All of these calls were over 65 seconds in length, that is one standard deviation above the mean time for fire calls. A problem was defined as behaviour which deviated from maximum efficiency or which seemed to slow down the interaction in any way.

Fourteen problems were initially identified. Two of these, a bad telephone line and the caller mishears what the operator has said occurred only in a subset of calls where one or other party had difficulty hearing the other. They were therefore collapsed to one problem, hearing difficulties. Likewise the caller not knowing some information co-occurred with the caller giving directions and the one instance of a problem with the caller's attitude appeared in a call where the operator also showed signs of a frayed temper.

The final list of ten identified interaction problems was: repetition, operator equivocal, hearing difficulties, caller very anxious, caller gives directions, caller gives incorrect information, spelling required, call already taken, caller not anxious, caller gives irrelevant information. Examples of these problems are given below.
Repetition

In an efficient call, information would be dealt with once and once only. In some calls, however, information was given several times. This was counted as a problem if it was apparent that the information had been received and understood by the operator. The operator might, for example, repeat or paraphrase what the caller has said. After this, all repetition of information takes time without adding to the operators knowledge.

Ref No. 1/4
1 Caller       Listen ah there's ah ... one of the cleaners you know the one of their rooms there's ah smoke coming, she's not sure where it's coming from she only begged me to dial you see
2 Operator    'S smoke issuing what road do we come to?
9 Caller      Yeah there's ah smoke coming and this lady begged me to dial you see
15 Caller     Yeah .. there's ah smoke but I don't know where it's coming from you see
21 Caller     There's ah smoke coming and I don't know where it's coming from

Hearing difficulties

Hearing difficulties can be caused simply by poor connections, by the caller having a strong accent or by the caller being hard of hearing. They make repetition necessary and therefore make the call less efficient.

Ref No. 1/13
11 Operator   .. OK then yeah what district does that come under
12 Caller     Sorry?
17 Operator   and what road does that come off of
18 Caller     Sorry?

Irrelevant information

Any information not directly connected with the address or the nature and severity of the incident is irrelevant to the fire brigade. Proffering such information merely slows the call down.
Chapter 5

Ref No. 15/4
25 Operator Is the fire actually out
26 Caller Yes but what I did you see I was on the phone
the police and everybody have been in to me all day and I was
cooking rice
27 Operator Yeh
27 Operator yeh is it is it out though now

Incorrect information
As the operator checks the road name given against the fire brigade index,
incorrect information can be spotted and corrected. It is obviously more
efficient if information is correct. There is no suggestion here that the caller
deliberately gives incorrect information. In this example the caller has
mistaken the postal district.

Ref No. 1/12
11 Operator OK what district 'sthat come under
12 Caller Ah . Mitcham
17 Operator ...... it's definitely Mitcham is it not
18 Caller Yeh it's Beddington Corner

Directions
This is the most direct manifestation of non-appreciation of centralised
control. The caller gives directions to get to the incident, presumably from
the local fire station, rather than giving a road name. In the following
example the caller has given the name of the road, the problem arises with
the name of the nearest main road. Directions are of little use to the fire
brigade, this is simply wasted time.

Ref No. 5/16
25 Operator And what road does it come off of
26 Caller ... Am
27 Operator What road sorry?
28 Caller Go through Woolwich and then you go through Abbey wood
and then you come along through Teddington
Spelling
Where spelling of a name is necessary the call is slowed down by the
difference between the time needed to say the name and to spell it.

Ref No. 2/2
11 Operator How do you spell it please
12 Caller P O R T H C A W E
13 Operator Yeh Yeh

Caller not anxious
At the other extreme from the caller being very anxious, a caller with no
sense of urgency will not be constrained by time.

Ref No. 15/4
2 Caller Ah good evening I'm a disabled matron living in sheltered
accommodation (O-Yes) I can't get the warden and I've had a
slight accident in the kitchen I've managed to put the fire
blanket on it (O-Yeh) ah but I'd be happy if you could come out
and look at it because there's forty-eight people in here

Caller very anxious
A caller who is very anxious may slow the call down because they are unable
to allow the call to proceed at a calm by steady pace. For example they may
not wait for the operator to finish speaking before offering information. This
can lead to simultaneous speech where what the caller is saying may not be
audible to the operator.

Ref No. 22/12
20 Caller Am High Road near the (-----) oh please hurry
21 Operator What's the other road
22 Caller Tre ha High Road
23 Operator High how you spelling it
24 Caller ---------------- trouble oh
25 Operator How're you spelling it
26 Caller Oh hurry
Calls to this incident already taken
This is not strictly speaking a problem but rather a reason why a call may be long. If the fire brigade is already aware of the incident the operator may use the opportunity of a second call to check details of the address or the severity of the incident. In this extreme example the caller takes the operators question literally and goes to check on whether the fire brigade as in fact arrived.

Ref No. 5/23
15 Operator Can you see them there in attendance they've just arrived
16 Caller Oh have they hang on (14 seconds) I didn't know if anyone had phoned

Operator equivocal
999 operators are usually patient and good tempered. There were instances, however, where the operator dealt with the caller in a terse and unhelpful manner. This may be a problem in that this is unlikely to make the caller more helpful. It may be that this attitude on the part of the operator is a result, rather than the cause, of problems in the call.

In the following example a child rang to report her bedroom on fire. By turn 27 the caller was in obvious distress. It is possible that the operator believed she was dealing with a malicious call.

Ref No. 22/12
27 Operator .. What's the telephone number you're calling from
28 Caller Pardon?
29 Operator WHAT IS THE TELEPHONE NUMBER YOU ARE CALLING FROM
30 Caller (----------------) 574 and I'm ringing for the fire brigade
31 Operator Yes so give me the telephone number properly
32 Caller Properly?
33 Operator GIVE ME THE TELEPHONE NUMBER you're calling from properly
34 Caller (----------------) 52 double 4
35 Operator I can't understand what you're saying
36 Caller Pardon I can't hear you
37 Operator Can't you? Put the phone in your other ear
MSA-I Analysis
The next step was to see whether these individual problems could be collapsed into a smaller number of super-ordinate problem types. The rationale for this reduction would be that certain problems tended to co-occur. As redundant problems, that is, those which always occur in conjunction with another similar problem, were removed to arrive at the final list of ten problems, the typology must be based on overlap rather than on identical distribution of problems across calls. The development of the typology was therefore based on the underlying patterns in the data.

The need to assess underlying patterns in multidimensional categorical data suggested that multidimensional scalogram analysis (MSA-I) was the most appropriate technique. MSA-I is particularly appropriate for use with exploratory data for two reasons. First, no assumptions are made about the underlying distribution of the data (Shalit, 1977). Second, MSA-I represents the data in a graphical form which allows patterns in data to be inspected while retaining the individuality of each case and variable. Each case and its profile is shown in the program's output. This would appear to be more appropriate in dealing with a small sample, particularly where the calls were chosen because they were unrepresentative of the corpus, than any method which would involve averaging or otherwise summarising the data.

An example of the use of MSA-I with a similar purpose, to develop a typology from exploratory is given by Tyerman and Canter's (1983) use of the technique to produce a taxonomy of hostels for alcoholics. The data consisted of scores for 22 hostels on 17 classificatory variables. Using MSA-I, Tyerman and Canter found that only four of these variables actually distinguished between hostels and that these four variables were aspects of a single categorisation system.

The output of MSA-I is a graphical representation in the form of a plot (usually two-dimensional) where each case is positioned in relation to all the others on the basis of similarity or dissimilarity across all the variables.
included in the analysis. In this study cases were telephone calls, variables were problems and each variable had only two possible values, occurrence and non-occurrence. As the cases are positioned relative to each other the axes of the plot are not necessarily meaningful for analysis. The program attempts to position points to produce contiguous regions for each variable, that is, regions of the plot where all cases have the same value for that variable. The final position of the point representing each case is therefore arrived at by the program attempting to position points so as to produce distinct regions for all variables simultaneously.

For any variable the regions can be shown by marking each point with that case's value on the variable in question. It should then be possible to draw a line between cases with different values to produce as many partitions of the plot as the possible values on that variable.

As in the case of Tyerman and Canter (1983) study it is possible that not all variables discriminate between cases. When this is true those variables give plots which cannot be partitioned into discernible regions. The null hypothesis is therefore that none of the variables will distinguish between cases, in the present case that the occurrence of problems does not distinguish between calls.

Each of the 16 longest calls was given a score for each problem indicating whether that problem did or did not occur in the call, 1 or zero. This produced a 16x10 matrix, shown in table 1 below, which was input to the MSA-I. The program first collapses cases with identical profiles to produce unique types. Here calls 1/13 and 23/15 had identical profiles, so that the analysis was carried out on 15 types.
Table 1  Incidence of 10 problems across 16 calls.

<table>
<thead>
<tr>
<th>Ref no</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>Time/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>89</td>
</tr>
<tr>
<td>1/12</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<td>1</td>
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</tr>
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<td>1</td>
<td>1</td>
<td>1</td>
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<td>66</td>
</tr>
<tr>
<td>23/15</td>
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<td>75</td>
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<td>1</td>
<td>1</td>
<td>94</td>
</tr>
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<td>0</td>
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<td>1</td>
<td>88</td>
</tr>
<tr>
<td>4/19</td>
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<td>0</td>
<td>1</td>
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<td>0</td>
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<td>0</td>
<td>1</td>
<td>77</td>
</tr>
<tr>
<td>5/16</td>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>94</td>
</tr>
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<td>5/22</td>
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<td>1</td>
<td>71</td>
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<td>5/23</td>
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<td>1</td>
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<td>76</td>
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</tr>
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<td>101</td>
</tr>
<tr>
<td>15/10</td>
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<td>0</td>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>76</td>
</tr>
<tr>
<td>22/12</td>
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<td>0</td>
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<td>1</td>
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<td>1</td>
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<td>1</td>
<td>0</td>
<td>84</td>
</tr>
<tr>
<td>24/8</td>
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<td>1</td>
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<td>131</td>
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</tbody>
</table>

Key to problems.

A  Repetition
B  Hearing difficulties
C  Irrelevant information
D  Incorrect information
E  Directions
F  Spelling
G  Caller not anxious
H  Caller very anxious
I  Call already taken
J  Caller equivocal

Results of the MSA-I

The summary plot (figure 1) shows the calls plotted according to the similarity of their profiles of problem occurrence. There is one cluster of calls to the centre left of the plot, with most of the other calls being positioned to the right of the plot.
Figure 2 shows the plot for each problem. For each of these variables a region could be mapped onto the plot which included all calls in which that problem occurred and only these calls. These regions have been indicated by shading.

On these variable plots the points representing the calls remain static. Therefore, it can easily be seen that call ref. 23/8, for example, scored a 1 on 'repetition', 'operator equivocal' and 'irrelevant information', that is these problem occurred in the call, but scored 0 on all other problems. Call ref. 4/19 shows a different pattern, with the problems 'caller not anxious', 'spelling', 'call already taken' and 'irrelevant information'.

Figure 1 MSA-I item plot, showing the position of points representing each call.

Variables (problems) which partition the space in the same way are related in that they discriminate between cases in a similar way. The problems were therefore grouped according to similarity in the topology of the regions they produce. This produced two groups of problems. Group 1- 'repetition', 'operator equivocal', 'hearing difficulties', 'caller very anxious', 'caller not
anxious' (with reversed score). These variables were characterised by partitions to the right of the plot. Although not all partitions overlap, for example, ‘repetition’ and ‘caller very anxious’, the pattern of the partitions is similar. ‘Caller not anxious’ is included in this group as this plot is partitioned in the same pattern as the others but in reverse, so that all the calls which had scored on the other variables in this group did not score on caller not anxious. Those calls where the caller was judged to be very anxious were a subset of calls with ‘hearing difficulties’ as well as being, by definition, a subset of calls not scored on ‘caller not anxious’. ‘Repetition’ and ‘operator equivocal’ overlap to a large extent with ‘hearing difficulties’.

Variables in group 2 (‘caller gives incorrect information’, ‘spelling required’, ‘call already taken’, ‘caller gives directions’ and ‘caller gives irrelevant information’) tend to partition off the bottom left quadrant of the space. Although none of the regions include all these points, calls which are in this region either display one of these problems (‘incorrect information’, ‘spelling’, ‘call already taken’) or these calls did not have that problem (‘directions’ and ‘irrelevant information’).

Taken together, the two groups of variables divide the space vertically, distinguishing between one group of seven points to the right of the plot and the eight points, representing nine calls, to the left. When the time taken for each call was examined it was found that calls on the right had an average duration of 94.6 seconds against an average duration of 80.8 seconds for the calls on the left (see figure 3). It would therefore seem that problems from group 1 led to more time wastage than those from group 2. In order to look at the link between individual problems and the length of calls in more detail multiple regression was used.
Figure 2  MSA-I variable plots.

- Denotes that the problem occurred

**Group 1**

- Repetition
- Operator equivocal
- Hearing difficulties

**Group 2**

- Incorrect information
- Spelling
- Call already taken

- Directions
- Irrelevant information
Figure 3  MSA-I item plot showing the duration of each calls in seconds.

Multiple regression analysis
The incidence of each type of problem was regressed against time for 60 calls which were the first call to an incident. These calls included the 16 longest calls. While a call being a repeat call to an incident was identified as a problem, it is problematic only in that the call may be long. The length of these calls does not actually matter as appliances have already been dispatched to the incident. Therefore for this analysis this variable and second or subsequent calls were not considered. The results of the regression analysis are given in table 3 below.
Results of multiple regression analysis.

Table 2  Multiple regression, dependent variable: time, independent variables: the occurrence or non occurrence of each of 9 problems.

Dependent Variable : TIME

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Coefficient</th>
<th>Std. Err. Estimate</th>
<th>t Statistic</th>
<th>Prob &lt; t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>31.783</td>
<td>4.563</td>
<td>6.965</td>
<td>0.000</td>
</tr>
<tr>
<td>Repetition</td>
<td>20.765</td>
<td>7.828</td>
<td>2.653</td>
<td>0.010</td>
</tr>
<tr>
<td>Operator equivocal</td>
<td>28.445</td>
<td>11.710</td>
<td>2.429</td>
<td>0.018</td>
</tr>
<tr>
<td>Hearing difficulties</td>
<td>5.985</td>
<td>4.766</td>
<td>1.256</td>
<td>0.214</td>
</tr>
<tr>
<td>Caller very anxious</td>
<td>17.468</td>
<td>7.974</td>
<td>2.191</td>
<td>0.033</td>
</tr>
<tr>
<td>Directions</td>
<td>8.157</td>
<td>5.201</td>
<td>1.568</td>
<td>0.122</td>
</tr>
<tr>
<td>Caller not anxious</td>
<td>23.431</td>
<td>10.797</td>
<td>2.170</td>
<td>0.034</td>
</tr>
<tr>
<td>Irrelevant</td>
<td>15.095</td>
<td>5.666</td>
<td>2.664</td>
<td>0.010</td>
</tr>
<tr>
<td>Incorrect</td>
<td>34.150</td>
<td>9.052</td>
<td>3.773</td>
<td>0.000</td>
</tr>
<tr>
<td>Spelling</td>
<td>4.934</td>
<td>4.948</td>
<td>0.997</td>
<td>0.323</td>
</tr>
</tbody>
</table>

ANOVA table

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>Deg of Freedom</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>Prob&lt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>19664.13</td>
<td>9</td>
<td>2184.90</td>
<td>7.48</td>
<td>0.00</td>
</tr>
<tr>
<td>Error</td>
<td>14614.21</td>
<td>50</td>
<td>292.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34278.33</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The constant of 31.78 seconds gives a reasonable estimate of the time taken for a short efficient call, although there were calls of less than 30 seconds in the sample. The 9 problems account for 57.4% of the variance without taking into account the extent of the problem within each call. The number of different types of problem which occurred in a call explained only 40.4% of variance when regressed against time. Therefore it seems to be the type of problem, not the number of problems in a call which lead to time delays.

‘Repetition’, ‘operator equivocal’, ‘caller very anxious’, ‘caller not anxious’, ‘irrelevant information’ and ‘incorrect information’ give rise to the largest time delays. That the caller giving ‘incorrect information’ should lead to
delays is self evident. The other problems seem to be stress related, either the caller is under great stress, leading to repetition of the same words, phrases and information, lack of patience in the operator, the caller speaking quickly and not waiting for the operator to finish speaking, or the caller shows no signs of stress or urgency, leading to a relaxed style of speech and possibly also the introduction of irrelevant information into the call.

Overall, problems in group 1 tend to be associated more with the length of the call than those in group 2.

DISCUSSION
Given that only 16 calls were studied to produce the initial content analysis a large number of problems were evident. Thus although the calls are limited in time, topic and purpose a number of things can go wrong with the interaction. Some of these are because the caller fails to grasp the limited nature of the interaction. Others are caused by the nature of the communication channel ('hearing difficulties' being caused either because there is noise on the line or because allowances are not made by the interactants for the limitations of the channel).

Broadly speaking, the problems can be broken down into those which are situation specific (group 1) and those to do with information transfer (group 2). Some of the problems in group 1, 'repetition' and 'hearing difficulties', can be related to the fact that the conversation takes place over a sound-only channel. The problems to do with the operator's and caller's stress levels may also be thought of as being products of the conversational situation. The problems in group 2 - 'incorrect information', 'spelling' and (not) 'irrelevant information' - deal with the task rather than the situation. Directions involves a misunderstanding of the situation by the caller. The 'call already taken' category is also information related, as for these calls the operator already has the necessary information, but may wish to check its accuracy. Therefore, this group can be thought of as involvement with information transfer, checking against discarding.
It was found from the regression of problems against time that the situation specific problems tended, on the whole, to be more strongly associated with time loss. Studies cited at the start of this chapter showed that telephone calls were as efficient as face-to-face interaction, in terms of accuracy of information, and tend to be short (Champness and Reid, 1970, Davies, 1971a, 1971b, Short, Williams and Christie, 1976, Tysoe, 1985). While no comparison with face-to-face interaction is possible here, it does appear that those problems which tend to reduce efficiency most are those which have to so with the specific situation of an emergency call. In this group is included hearing difficulties which tend to be caused by the quality of the sound-only link. This is one instance where telephone conversation may undoubtedly suffer in comparison to face-to-face interaction. However, it does seem that problems in these calls may not be the result primarily of the fact that there is no face-to-face communication but that they arise from the emergency situation.

Considering the number of problems which can occur it would appear that the interaction is constantly monitored for possible misunderstanding or mismatches of information and intentions. Two aspects of this monitoring are examined further in the following chapters. First, there is a good deal of repetition of operators questions. This is not the repetition referred to as a problem here but rather immediate reiteration of requests for information to overcome the caller mishearing or misunderstanding. Second, the operator uses listener responses and other utterances to acknowledge the receipt of information, thus keeping the caller aware of how their speech is understood.

The use of listener responses is an aspect of turn management which will be considered in the next chapter, as listener responses or back-channel utterances are generally seen as a method of encouraging a speaker to continue, in other words giving them control of the floor.
CHAPTER 6 ASPECT 1: TURN MANAGEMENT

INTRODUCTION
The purpose of this study was to examine whether turn management was used as a method of controlling the interaction in emergency calls. In this study a distinction is made between dominance in the sense of control for it's own sake and control in the sense of organisation of the conversation in the interests of completing the call efficiently. In practice this is a distinction between socially defined dominance and task defined dominance. The former relates to the relationship between the interactants. If the relationship is to be defined partly by dominance then one party must have some influence over the relationship and over its manifestation in conversation. Task defined dominance, on the other hand, need not imply a continuing dominance-based relationship, but rather that one party takes charge of completing the task.

Two characteristics of the interactants are considered, sex and role / status. As was discussed in chapter 2, a number of studies have shown that many aspects of men’s conversational style can be characterised as being more dominant than women’s. For example men speak more than women (Argyle, Lalljee and Cook, 1968; Bernard, 1972; Duncan and Fiske, 1977; Eakins and Eakins, 1976; Kenkel, 1963; Strodtbeck and Mann, 1956; Strodtbeck, 1975; Strodtbeck, James and Hawkins, 1956; Swacker, 1976). It has also been found that men interrupt women more than vice versa (Argyle et al 1968; Eakins and Eakins, 1976; Esposito, 1979; McMillan, Clifton, McGrath and Gale, 1977; Natale, Entin and Jaffe, 1979; Octigan and Niederman, 1979; Zimmerman and West, 1975).

As has been shown in Chapter 3, however, previous findings on turn management, particularly interruptions, have been contradictory. Two studies found that women interrupted each other more than did men (Hirschman, 1973; Ofshe, 1981). Shaw and Sadler (1965) studying heterosexual couples, found that women interrupted their partners more than did men, while Courtright, Millar and Rogers Millar (1979) found that for married
couples the more domineering partner interrupted more, regardless of their sex.

However, the majority of studies have found evidence for male dominance. Many of the contradictory findings come from studies where the dyads already had a well developed relationship (Shaw and Sadler, 1965; Courtright et al., 1979) or where other cultural or situational effects seem to have had a bearing on interaction (cf. Hershey and Werner's (1975) study of feminists vs non-feminists and Askinsas's (1971) study of women from mixed- or single-sex housing). In a case where no external influences need to be taken into account, or where these influences are not constant, men may be expected to be more dominant than women.

Concentrating on the behaviour and characteristics of the speaker, then, these studies would predict that men would show more dominance behaviour than women. It has also been found (Hoffman, 1980) that the sex of the person spoken to may be more important than the sex of the speaker in determining the use of interruptions, so that women are interrupted more than men, regardless of the sex of interrupter. Both the sex of the person speaking and that of the listener are taken into account in this study.

Leet-Pellegrini (1980) carried out a study which examined both sex related and task related dominance. Same sex and mixed sex dyads were given a problem solving task and the difference in partners' interaction styles were assessed. In addition, in some dyads one person was given more information relevant to the problem than the other, so that they had 'expert' status. Leet-Pellegrini found an interaction between sex and expertise, so that while experts spoke more than non-experts, male experts also speak more than female experts. Female experts used more supportive assent terms than did male experts and they used more with male than with female partners. It would therefore seem that expert status conferred power on men, or at least the licence for dominance, but did not do so for women.
A study of 146 fire alarm calls was therefore conducted to examine the effects of sex and role on the speech style of interactants in the context of turn management. In the case of these calls, all the dyads have unequal role status, that is, there is always one operator and one caller. Since the operator is the representative of the fire brigade and the person in charge of organising the call, operators are expected to be more controlling than callers. Also, men are expected to exert more control than women, regardless of their role. Finally, both sexes are expected to display more control with a female partner than with a male partner.

In order to examine sex and role effects three measures of speech style were used. Two measures of control dealt directly with turn management and control over the "floor", specifically the number and type of interruptions used and the amount of speech by each partner. Both the use of interruptions as a measure of control or dominance and coding schemes for interruptions have been discussed previously (chapter 2). In summary, interruptions may be defined as instances where there is simultaneous speech by both parties or where the current speaker does not seem to complete an utterance before the next speaker takes over. Interruptions can be classified in two independent ways. Firstly, the speech incident may or may not be intended as interruptive. Speech referred to as 'back-channel' speech or 'listener responses' is produced by the listener during their partner's speaking turn. Even though this speech may be simultaneous with the speaker's utterance it is not an attempt to gain the floor but to signal that the listener is both attending and interested. It is therefore considered to be supportive of the status quo rather than interruptive.

Interruptions are not a unitary phenomenon. Ferguson (1977) found no relationship between the overall rate of interruptions and self-reported dominance. However, people who rated themselves high on dominance used more overlaps, that is interruptions where the initial speaker completes their utterance. Beattie (1981), in a study of tutorial groups, found that tutors used more overlaps than did students. Students tended to use simple interruptions, where the initial speaker does not complete their utterances,
when they interrupted each other. Beattie interprets this finding by considering the tutorial system. Students interrupt because they must compete for the tutor's attention, while the tutor's role is to be encouraging. Therefore, the tutor allows students to complete what they are saying. This interpretation suggests that simple interruptions are more competitive than overlaps.

By far the most comprehensive scheme for classifying interruptions is that developed by Roger, Bull and Smith (1988). However, the very complexity and comprehensiveness of the scheme make it most suitable for large quantities of data. Given that the average length of a fire alarm is 45 seconds the present sample does not warrant this level of complexity. It was decided therefore to use the Ferguson (1977) scheme as a basic coding scheme and to concentrate within that scheme on the most basic types of intended successful and unsuccessful interruptions; simple and butting-in.

As has been emphasised above and in more detail in chapter 2, dominance can be manifested through the amount of interaction space taken up by either party. The number of words spoken was used as a measure of interaction space or command over the floor. Given the relatively short turns, the sometimes rapid pace of the speech and the high information content characteristic of these calls, a measure based on amount of content rather than time seemed most appropriate. It is expected that, as in the Leet-Pellegrini (1980) study, experts, that is operators, will speak more than non-experts, that is callers, and that male experts will speak more than female experts.

As this study in part replicates Leet-Pellegrini (1980) a measure of supportiveness, number of assent terms, used in that study was included here. Assent terms may have at least two supportive functions in turn management. They are commonly used as back-channel responses and they can signal a recognition that the floor has been handed over. Leet-Pellegrini found that assent terms were used more by male non-experts and by females, whether they were experts or not. Thus in the present study given that the
operator is assumed to be the expert, the caller should be more supportive than the operator and female callers more supportive than male callers.

Because, unlike in many other studies, these calls are real conversations in which there are degrees of potential urgency, aspects of the situation may also be expected to exert an influence on the interaction. The importance and urgency of each interaction may be dependent on the incident being reported. To examine this dimension of urgency, calls to two types of incident were examined, fire and special services.

Special services (SS) is a term used by the fire brigade to denote incidents which require their attendance but where there is no fire, for example, people trapped in a lift or people locked out of their homes. These incidents are less urgent than fire for two reasons. First, there is rarely any immediate danger to the safety of those involved and second, the level of hazard does not escalate in the same way as with fires. Thus, while a call to a person trapped in a lift is important and has some degree of urgency, barring a major malfunction, the danger does not actually increase over time. This difference is evidenced in the difference in mean time taken for the two types of call to be processed. Fire calls took a mean time of 44.4 seconds, while special services took 56.6 seconds.

As the task is likely to be more urgent and important in fire incidents the calls should be more task oriented and therefore should show more evidence of conversational control. Fire calls should therefore tend to have a more unequal distribution of speech than special services calls, with operators speaking more than callers. There should be more interruptions in fire calls, particularly by the operators and there should be fewer assent terms used in fire calls.
Research questions

Role related control
1. Are operators less supportive and more controlling than callers, that is, do they use more interruptions and fewer assent terms and retain the floor for longer than callers?

Sex related control
2. Are male operators more controlling than female operators especially in mixed sex calls?
3. Are female callers less controlling than male callers, especially in mixed sex calls?

Situation specific control
4. Are there differences in speech style for operators or callers between fire and special services calls?

METHOD

Sample
The sample consisted of 146 calls to either fire or special services incidents, to give two samples of calls with differing levels of implied urgency. This classification of 'fire' calls excludes grass, rubbish and chimney fires and therefore covers mainly calls to fires in buildings. Special services incidents can include calls where there is danger to life, for example to use cutting equipment in road traffic accidents. In these cases the urgency of the call is probably at the same level as calls to fires. This type of SS incident was, therefore, excluded from the sample as they were not likely to represent a lower level of urgency.

The total sample of calls is biased toward female operators. As sex differences were to be examined in this study a random sample of calls was boosted by taking every call with a male operator which fitted the above criteria on a further sample of seven tapes. This produced an additional 31 conversations. Calls from children were excluded from this analysis as they represented too small a sample for meaningful statistical analysis. The sample was broken down by role and sex as follows.
Table 1  Sample sizes by sex and role.

<table>
<thead>
<tr>
<th>Operator</th>
<th>Fires Caller</th>
<th>Special Services Caller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Male</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>53</td>
</tr>
<tr>
<td>Total by caller sex</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Total by incident</td>
<td>113</td>
<td></td>
</tr>
</tbody>
</table>

**Behavioural coding**

Three types of measure were taken for each call; interruptions, number of whole words spoken and number of assent words spoken (e.g. yes, right, OK, mm-hmm). Of these interruptions and number of words are related to increasing dominance and number of assent words to increasing supportiveness. Turn exchanges were coded according to Beattie (1981a), a system which is a modification of Ferguson (1977), using transcripts and tapes (see figure 1). Although this system has faults (Roger, Bull and Smith, 1988) it serves here to distinguish between potentially more and less intrusive interruptions, e.g. simple interruption vs silent interruptions.
1 Speaker switches were counted from
O: "Hello, fire brigade / can I help you"

or from the caller's first "hello" if the operator does not reply with one. This restriction was introduced to ensure that the conversation was taken to begin when the caller knew s/he was talking to the fire brigade rather than the British Telecom operator.

2 If the speaker retained the turn, vocalisations from the listener such as "yes" or "no" were counted as back-channel responses where they served to confirm what the speaker was saying or where they signaled that the auditor had heard. They were counted as turns if they were a one word answer to a question, either direct or indirect.

3 The call closing was not counted. The last turn considered was the operator's last main turn e.g. "OK, be there shortly". The final call
closings are often synchronised so that the operator and caller can speak in unison for several turns. As it would seem that these are not intended as interruptions it was decided to remove this section of the conversations from the analysis.

4 'Completeness' was judged intuitively on the basis of intonation, syntax and semantics, the same clues that the participants in the interaction would use to judge whether the other had finished speaking.

Example of speaker switches

1 Smooth speaker switch

Operator    Yeah what road do we come to?
Caller      This is ah Marsden House Overto ah Overton Road Fiveways road

2 Overlap

Caller      Yeah there's ah smoke coming and this lady begged me to dial you see
Operator    OK yeah what district does that come from?

3 Simple interruption

Operator    I can't I what's this sh yes Shelley Court what's the
Caller      beginning to get alight Sorry mate it's

4 Butting-in interruption

Caller      Ah the well there there there are trees and shrubs and grass and ah my house is on the common and it's getting quite clo quite close
Operator    yeh Q
5 Silent interruption

Operator    Can you give us another road off of am
Caller      Carlshalton Road love it's off Carlshalton Road

Note: Underlining indicates simultaneous speech.

Dependent variable computation
As the point of interest in this study is turn management, that is the gaining
and relinquishing of the floor, the rate of interruptions relative to all speaker
switches is more meaningful than their frequency. Therefore, interruptions
were recoded as a percentage of the number of turns in the interaction. The
number of assent words used were recoded as a percentage of total words so
that the measure represented the rate of assent word usage.

RESULTS
I Type of incident
The last research question was addressed first, as the design of subsequent
analyses would need to take any differences between the incident types into
account. That is, if the interactants' speech style was affected by the degree of
urgency of the situation then fire and special services calls would need to be
dealt with separately.

Differences between the two samples of calls were tested using Z tests, the
results of which are shown in table 2. The only difference which approached
significance was that between the callers' use of interruptions in the two types
of call, with callers interrupting more in special services calls. This indicates
that rather than interruptions being a product of urgency, the reverse would
appear to be true. This lack of difference between the two types of call may
have two causes. First, it is possible that the difference in urgency is
insufficient to make a difference in how the interactants converse. That is,
since both types of calls are to an emergency the distinction between the
degree of danger is insufficient in itself or insufficiently consistent across the
calls to produce behavioural differences. The second possibility is that the
variables used do not measure behaviour which would be influenced by urgency.

Table 2 Mean and standard deviations for fire and special services calls on all variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean F</th>
<th>Stdev F</th>
<th>Mean SS</th>
<th>Stdev SS</th>
<th>Z</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. words op</td>
<td>55.72</td>
<td>33.49</td>
<td>59.67</td>
<td>30.15</td>
<td>-.65</td>
<td>ns</td>
</tr>
<tr>
<td>No. words caller</td>
<td>58.21</td>
<td>33.83</td>
<td>68.06</td>
<td>47.04</td>
<td>-1.14</td>
<td>ns</td>
</tr>
<tr>
<td>% Assent words op</td>
<td>10.00</td>
<td>5.07</td>
<td>9.47</td>
<td>4.65</td>
<td>.56</td>
<td>ns</td>
</tr>
<tr>
<td>% Assent words caller</td>
<td>5.51</td>
<td>4.39</td>
<td>7.09</td>
<td>4.48</td>
<td>-1.81</td>
<td>ns</td>
</tr>
<tr>
<td>Interruptions op</td>
<td>10.33</td>
<td>13.32</td>
<td>10.68</td>
<td>13.84</td>
<td>-.25</td>
<td>ns</td>
</tr>
<tr>
<td>Interruptions caller</td>
<td>9.80</td>
<td>11.55</td>
<td>13.10</td>
<td>12.26</td>
<td>-1.32</td>
<td>p&lt;0.1</td>
</tr>
</tbody>
</table>

As this was the only difference between the two types of call, the samples were analysed simultaneously in the subsequent analysis.

II Role and sex effects.
The hypotheses regarding the links between the style of the interactants and their role and sex were designed to be answered using analysis of variance. Taking the call as the unit of analysis, three factors were considered: speaker (operator or caller), sex of operator and sex of caller. Since the unit of analysis was the call, it could be argued that the speaker factor was a repeated measure as each pair of speaker and caller measures refer to one call. Treating this factor as a repeated measure would, however, require an assumption that the speaker's speech style was influenced by the style of their partner. Correlations were therefore computed for the two partners in each dyad and are presented in table 3. The first column gives the correlation coefficients for the sample as a whole. The other columns give coefficients for each type of dyad, male operators with male callers, male operators with female callers and so on.

As the number of words spoken by each person is likely to correlate simply because the calls were not of fixed length, this variable was not included. Only one of these correlations, unsuccessful interruptions, was significant for the total sample. It was decided, therefore, not to treat speaker as a repeated
measure. As a number of variables are to be considered separately this, more conservative, design was felt to be appropriate.

Table 3  Correlations between variables for partners in each dyad.

<table>
<thead>
<tr>
<th>Variable</th>
<th>All</th>
<th>OMCM</th>
<th>OMCF</th>
<th>OFCM</th>
<th>OFCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assent words</td>
<td>-.15</td>
<td>.09</td>
<td>-.27</td>
<td>-.04</td>
<td>-.33c</td>
</tr>
<tr>
<td>Total Interruptions</td>
<td>.05</td>
<td>-.02</td>
<td>.00</td>
<td>.03</td>
<td>.08</td>
</tr>
<tr>
<td>Successful interruptions</td>
<td>.08</td>
<td>-.11</td>
<td>-.06</td>
<td>-.11</td>
<td>.35b</td>
</tr>
<tr>
<td>Unsuccessful interruptions</td>
<td>.35b</td>
<td>.77a</td>
<td>-.04</td>
<td>.17</td>
<td>.38b</td>
</tr>
<tr>
<td>Overlaps</td>
<td>.00</td>
<td>-.03</td>
<td>-.09</td>
<td>.12</td>
<td>-.04</td>
</tr>
</tbody>
</table>

a p<0.001  b p<0.01  c p<0.05

IIa  Interaction space

It was expected that operators would speak more than callers, with male operators speaking more than female operators and male callers speaking more than female callers. However, as can be seen from table 4 below, no significant effects were found involving the number of words spoken by either partner. A summary of the ANOVA is presented in table 4 below.

There was, however, a significant interaction between operator sex and caller sex (F(1,284) = 4.38, p<0.05) with same sex dyads using fewer words in total than mixed sex dyads.

Table 4  Summary of Analysis of Variance for number of words spoken.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker</td>
<td>1081.658</td>
<td>1</td>
<td>1081.658</td>
<td>.883</td>
<td>ns</td>
</tr>
<tr>
<td>Operator sex</td>
<td>359.389</td>
<td>1</td>
<td>359.389</td>
<td>.293</td>
<td>ns</td>
</tr>
<tr>
<td>Caller sex</td>
<td>1153.248</td>
<td>1</td>
<td>1153.248</td>
<td>.942</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Operator sex</td>
<td>1076.965</td>
<td>1</td>
<td>1076.965</td>
<td>.879</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Caller sex</td>
<td>577.717</td>
<td>1</td>
<td>577.717</td>
<td>.472</td>
<td>ns</td>
</tr>
<tr>
<td>Operator sex Caller sex</td>
<td>5358.545</td>
<td>1</td>
<td>5358.545</td>
<td>4.376</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Speaker Op sex Caller sex</td>
<td>113.472</td>
<td>1</td>
<td>113.472</td>
<td>.093</td>
<td>ns</td>
</tr>
<tr>
<td>Residual</td>
<td>347780.955</td>
<td>284</td>
<td>1224.581</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>357744.562</td>
<td>291</td>
<td>1229.363</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

82
It might be expected that calls would be shorter if the operator took control of the conversation, allowing the caller little say in the proceedings. In this case the operator should speak more relative to the caller. Alternatively the operator could be completely reactive, handing control of the conversation to the caller. In that case the operator would speak relatively little. In only one dyad type, female - female, did the operator speak as much as the caller. The dyad type where the operator spoke least was the male - male dyad. The more efficient calls, in terms of needing fewer words to reach completion, were therefore those where the operator took the most or the least control.

Table 5  Means and standard deviations for the number of words spoken in same and mixed sex dyads with the percentage of total words spoken by the operator.

<table>
<thead>
<tr>
<th>Operator sex</th>
<th>Caller sex</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>56.38</td>
<td>64.68</td>
</tr>
<tr>
<td>Male</td>
<td>St dev</td>
<td>31.45</td>
<td>35.88</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>52</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>% by Op</td>
<td>45.80</td>
<td>47.50</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>62.90</td>
<td>52.90</td>
</tr>
<tr>
<td>Female</td>
<td>St dev</td>
<td>44.00</td>
<td>26.30</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>90</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td>% by Op</td>
<td>48.50</td>
<td>50.70</td>
</tr>
</tbody>
</table>
c.IIb Use of supportive utterances

Assent terms were used in this study as a measure of supportiveness, and it was predicted that callers would use more than operators, and female operators and callers would use more than their male counterparts. It was found that operators used more assent terms than did caller, regardless of the sex composition of the dyad ($F(1,284) = 53.62, p<0.001$). This finding runs contrary to the prediction, from Leet-Pellegrini (1981) that experts use fewer supportive utterances than non-experts.

A summary of the analysis of variance is presented in table 6 below, with the means and standard deviations for operators and callers shown in table 7.
Table 6  Summary of Analysis of Variance for percentage of assent words.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker</td>
<td>1198.219</td>
<td>1</td>
<td>1198.219</td>
<td>53.621</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Operator sex</td>
<td>8.508</td>
<td>1</td>
<td>8.508</td>
<td>.381</td>
<td>ns</td>
</tr>
<tr>
<td>Caller sex</td>
<td>3.071</td>
<td>1</td>
<td>3.071</td>
<td>.137</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Op Sex</td>
<td>6.160</td>
<td>1</td>
<td>6.160</td>
<td>.276</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Caller sex</td>
<td>.722</td>
<td>1</td>
<td>.722</td>
<td>.032</td>
<td>ns</td>
</tr>
<tr>
<td>Op Sex Caller sex</td>
<td>48.852</td>
<td>1</td>
<td>48.852</td>
<td>2.186</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Op sex Caller sex</td>
<td>30.014</td>
<td>1</td>
<td>30.014</td>
<td>1.343</td>
<td>ns</td>
</tr>
<tr>
<td>Residual</td>
<td>6346.342</td>
<td>284</td>
<td>22.346</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7641.532</td>
<td>291</td>
<td>26.260</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7  Mean and standard deviations for rate of assent term usage for operators and callers across dyad composition.

<table>
<thead>
<tr>
<th></th>
<th>Operator</th>
<th>Caller</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM CM</td>
<td>Mean</td>
<td>11.00</td>
</tr>
<tr>
<td></td>
<td>St dev</td>
<td>6.20</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>26</td>
</tr>
<tr>
<td>OM CF</td>
<td>Mean</td>
<td>8.60</td>
</tr>
<tr>
<td></td>
<td>St dev</td>
<td>5.26</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>22</td>
</tr>
<tr>
<td>OF CM</td>
<td>Mean</td>
<td>9.54</td>
</tr>
<tr>
<td></td>
<td>St dev</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>45</td>
</tr>
<tr>
<td>OF CF</td>
<td>Mean</td>
<td>10.26</td>
</tr>
<tr>
<td></td>
<td>St dev</td>
<td>4.98</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>53</td>
</tr>
<tr>
<td>Total sample</td>
<td>Mean</td>
<td>9.92</td>
</tr>
<tr>
<td></td>
<td>St dev</td>
<td>4.97</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>146</td>
</tr>
</tbody>
</table>

IIC  Interruptions

Interruptions were predicted to follow the same trends as amount of speech, with operators using more interruptions than callers, and males using more interruptions than females in both roles. In considering interruptions the rate of total interruptions used was considered first, with three types of
interruption, successful, unsuccessful and overlaps being considered separately in later sections.

Table 8 gives a summary of speaker switches broken down by role and sex. This table shows both the frequency and rate of interruptions. Since the calls could be of varying lengths the frequency of interruptions is reported for information only.

### Table 8 Summary of speaker switches by role and sex.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Smooth</th>
<th>Interruptions</th>
<th>Interr as %</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tot</td>
<td>Mean</td>
<td>Tot</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>O to C</td>
<td>1166</td>
<td>7.99</td>
<td>1033</td>
<td>7.08</td>
<td>133</td>
</tr>
<tr>
<td>C to O</td>
<td>1201</td>
<td>8.23</td>
<td>1063</td>
<td>7.28</td>
<td>138</td>
</tr>
<tr>
<td>OM to CM</td>
<td>199</td>
<td>7.65</td>
<td>182</td>
<td>7.00</td>
<td>17</td>
</tr>
<tr>
<td>OM to CF</td>
<td>196</td>
<td>8.91</td>
<td>172</td>
<td>7.82</td>
<td>24</td>
</tr>
<tr>
<td>OF to CM</td>
<td>369</td>
<td>8.20</td>
<td>330</td>
<td>7.33</td>
<td>39</td>
</tr>
<tr>
<td>OF to CF</td>
<td>402</td>
<td>7.58</td>
<td>349</td>
<td>6.58</td>
<td>53</td>
</tr>
<tr>
<td>CM to OM</td>
<td>208</td>
<td>8.00</td>
<td>188</td>
<td>7.23</td>
<td>20</td>
</tr>
<tr>
<td>CM to OF</td>
<td>377</td>
<td>8.38</td>
<td>334</td>
<td>7.42</td>
<td>43</td>
</tr>
<tr>
<td>CF to OM</td>
<td>198</td>
<td>9.00</td>
<td>169</td>
<td>7.68</td>
<td>29</td>
</tr>
<tr>
<td>CF to OF</td>
<td>418</td>
<td>7.89</td>
<td>372</td>
<td>7.02</td>
<td>46</td>
</tr>
</tbody>
</table>

Note: O - Operator, C - Caller, M - Male, F - Female

In the analysis of variance a significant effect for caller sex was found (F (1,284) = 7.15, p<0.01) with female callers using more interruptions than male callers and being interrupted more themselves. A summary of the analysis of variance is presented in table 9 below.
Table 9  Summary of Analysis of Variance for rate of interruptions.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker</td>
<td>1.391</td>
<td>1</td>
<td>1.391</td>
<td>.009</td>
<td>ns</td>
</tr>
<tr>
<td>Op sex</td>
<td>9.382</td>
<td>1</td>
<td>9.382</td>
<td>.060</td>
<td>ns</td>
</tr>
<tr>
<td>Caller sex</td>
<td>1118.568</td>
<td>1</td>
<td>1118.568</td>
<td>7.147</td>
<td>p&lt;0.01</td>
</tr>
<tr>
<td>Speaker Op sex</td>
<td>89.709</td>
<td>1</td>
<td>89.709</td>
<td>.573</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Caller sex</td>
<td>10.240</td>
<td>1</td>
<td>10.240</td>
<td>.065</td>
<td>ns</td>
</tr>
<tr>
<td>Op sex Caller sex</td>
<td>10.780</td>
<td>1</td>
<td>10.780</td>
<td>.069</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Op sex Caller sex</td>
<td>328.065</td>
<td>1</td>
<td>328.065</td>
<td>2.096</td>
<td>ns</td>
</tr>
<tr>
<td>Residual</td>
<td>44446.506</td>
<td>284</td>
<td>156.502</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>46042.773</td>
<td>291</td>
<td>158.223</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10  Means and standard deviations for the use of interruptions with male and female callers.

<table>
<thead>
<tr>
<th>Caller sex</th>
<th>Interrupter</th>
<th>Operator</th>
<th>Caller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>8.14</td>
<td>8.75</td>
</tr>
<tr>
<td>Male</td>
<td>St dev</td>
<td>11.67</td>
<td>11.72</td>
</tr>
<tr>
<td>N</td>
<td>71</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>12.56</td>
<td>12.24</td>
</tr>
<tr>
<td>Female</td>
<td>St dev</td>
<td>14.60</td>
<td>11.61</td>
</tr>
<tr>
<td>N</td>
<td>75</td>
<td>75</td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that the standard deviations for the rate of occurrence of interruptions are high, indicating a broad range for the use of interruptions across dyads.
There was no statistically significant sex difference for operators, indicating that male and female operator do no differ in either their use of interruptions or in the extent to which they are interrupted.

Total interruptions were then broken down into successful and unsuccessful interruptions, silent interruptions and overlaps. Table 11 shows a summary of the types of interruption broken down by role and sex. Overlaps were the most common type of interruption found and silent interruptions the least common. Because there were so few silent interruptions it was decided that these would not be included in the analysis.

The remaining three types of interruptions were considered separately. Overlaps have been found to be linked with dominance by Ferguson (1977). Beattie (1981), in contrast, found simple (successful) interruptions to be linked with straightforward attempts to gain the floor in a competitive situation. In unsuccessful (butting-in) interruptions, a speaker switch is not achieved by the interruptee, suggesting that the speaker is unwilling to acquiesce.
Table 11  Summary of interruption types by role and sex, showing the rate of occurrence of each interruption type.

<table>
<thead>
<tr>
<th>Transition</th>
<th>Overlap</th>
<th>Simple</th>
<th>Silent</th>
<th>Butting -in</th>
</tr>
</thead>
<tbody>
<tr>
<td>O to C</td>
<td>4.20</td>
<td>3.07</td>
<td>0.43</td>
<td>2.70</td>
</tr>
<tr>
<td>C to O</td>
<td>5.27</td>
<td>3.26</td>
<td>0.43</td>
<td>1.58</td>
</tr>
<tr>
<td>CF to OF</td>
<td>5.39</td>
<td>2.97</td>
<td>0.21</td>
<td>2.63</td>
</tr>
<tr>
<td>CM to OF</td>
<td>4.87</td>
<td>3.08</td>
<td>0.59</td>
<td>0.87</td>
</tr>
<tr>
<td>CM to OM</td>
<td>4.11</td>
<td>2.65</td>
<td>0.00</td>
<td>0.85</td>
</tr>
<tr>
<td>CM to OM</td>
<td>7.16</td>
<td>5.08</td>
<td>1.16</td>
<td>1.36</td>
</tr>
<tr>
<td>CF to OM</td>
<td>5.52</td>
<td>4.15</td>
<td>0.58</td>
<td>3.02</td>
</tr>
<tr>
<td>CF to OM</td>
<td>4.10</td>
<td>1.99</td>
<td>0.10</td>
<td>1.86</td>
</tr>
<tr>
<td>OF to CF</td>
<td>2.83</td>
<td>1.89</td>
<td>0.55</td>
<td>3.02</td>
</tr>
<tr>
<td>OM to CM</td>
<td>2.14</td>
<td>4.09</td>
<td>0.57</td>
<td>3.30</td>
</tr>
</tbody>
</table>

IIc  Interruptions: Successful interruptions.
Simple interruptions, involving simultaneous speech and a speaker switch before the initial speaker completes his or her utterance, are the most apparently dominant of the interruptions types. The hypothesis was that males and operators would use most successful interruptions.

The same effect for caller sex was found for successful interruptions as was found for interruptions in total, although the effect was much weaker \(F(1,284) = 2.76, p<0.1\). No other main effects or interactions reach even this low significance level.
### Table 12  Summary of Analysis of Variance for rate of successful interruptions.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker</td>
<td>2.637</td>
<td>1</td>
<td>2.637</td>
<td>.048</td>
<td>ns</td>
</tr>
<tr>
<td>Op sex</td>
<td>8.313</td>
<td>1</td>
<td>8.313</td>
<td>.150</td>
<td>ns</td>
</tr>
<tr>
<td>Caller sex</td>
<td>152.793</td>
<td>1</td>
<td>152.793</td>
<td>2.755</td>
<td>p&lt;0.1</td>
</tr>
<tr>
<td>Speaker Op sex</td>
<td>12.381</td>
<td>1</td>
<td>12.381</td>
<td>.223</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Caller sex</td>
<td>38.090</td>
<td>1</td>
<td>38.090</td>
<td>.687</td>
<td>ns</td>
</tr>
<tr>
<td>Op sex Caller sex</td>
<td>26.593</td>
<td>1</td>
<td>26.593</td>
<td>.480</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Op sex Caller sex</td>
<td>24.884</td>
<td>1</td>
<td>24.884</td>
<td>.449</td>
<td>ns</td>
</tr>
<tr>
<td>Residual</td>
<td>15749.710</td>
<td>284</td>
<td>55.457</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16014.509</td>
<td>291</td>
<td>55.033</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 13  Means and standard deviations for the use of successful interruptions with male and female callers.

<table>
<thead>
<tr>
<th>Caller sex</th>
<th>Interrupter</th>
<th>Operator</th>
<th>Caller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>1.95</td>
<td>2.92</td>
</tr>
<tr>
<td>Male</td>
<td>St dev</td>
<td>5.05</td>
<td>7.59</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>4.13</td>
<td>3.59</td>
</tr>
<tr>
<td>Female</td>
<td>St dev</td>
<td>8.99</td>
<td>7.37</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>75</td>
<td>75</td>
</tr>
</tbody>
</table>
IIc Interruptions: Unsuccessful interruptions.
Unsuccessful, or butting-in, interruptions indicate that the interrupter attempted to gain the floor but failed to do so. If one person in a dyad tended to use successful interruptions, while their partner tended toward unsuccessful interruptions, this would indicate a clear dominance on the part of the more successful partner. In the present study, however, the same pattern was found for unsuccessful as for successful interruptions (F(1,284) = 2.75, p<0.1). In addition the factor speaker tended towards significance(F(1,284) = 2.85, p<0.1).

Although these effects are significant only at the 0.1 level they are worthy of consideration as the caller sex effect forms part of a pattern and because the design chosen for the analysis is conservative with regard to effect for speaker.
Table 14  Summary of Analysis of Variance for rate of unsuccessful interruptions.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker</td>
<td>92.614</td>
<td>1</td>
<td>92.614</td>
<td>2.850</td>
<td>p&lt;0.1</td>
</tr>
<tr>
<td>Op sex</td>
<td>.197</td>
<td>1</td>
<td>.197</td>
<td>.006</td>
<td>ns</td>
</tr>
<tr>
<td>Caller sex</td>
<td>89.451</td>
<td>1</td>
<td>89.451</td>
<td>2.753</td>
<td>p&lt;0.1</td>
</tr>
<tr>
<td>Speaker Op sex</td>
<td>29.374</td>
<td>1</td>
<td>29.374</td>
<td>.904</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Caller sex</td>
<td>4.067</td>
<td>1</td>
<td>4.067</td>
<td>.125</td>
<td>ns</td>
</tr>
<tr>
<td>Op sex Caller sex</td>
<td>18.204</td>
<td>1</td>
<td>18.204</td>
<td>.560</td>
<td>ns</td>
</tr>
<tr>
<td>Speaker Op sex Caller sex</td>
<td>.570</td>
<td>1</td>
<td>.570</td>
<td>.018</td>
<td>ns</td>
</tr>
<tr>
<td>Residual</td>
<td>9227.803</td>
<td>284</td>
<td>32.492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9464.075</td>
<td>291</td>
<td>32.523</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 15  Means and standard deviations for the use of unsuccessful interruptions with male and female callers.

<table>
<thead>
<tr>
<th>Caller sex</th>
<th>Interrupter</th>
<th>Operator</th>
<th>Caller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>2.28</td>
<td>0.86</td>
</tr>
<tr>
<td>Male</td>
<td>St dev</td>
<td>6.57</td>
<td>3.04</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>3.10</td>
<td>2.26</td>
</tr>
<tr>
<td>Female</td>
<td>St dev</td>
<td>6.84</td>
<td>5.38</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>75</td>
<td>75</td>
</tr>
</tbody>
</table>
Operators tended to use more unsuccessful interruptions, perhaps indicating acquiescence on their part. Once again female callers interrupt and are interrupted more than male callers.

IIc Interruptions: Overlaps
Overlaps were the only interruption type found by Ferguson (1977) to be linked to self-rated dominance. It would therefore be expected that men and operators would use a higher percentage of this type of interruption.

No significant effects were found for overlaps, indicating that their use is not linked to either role or sex. This suggests that in the case of these calls overlaps may be primarily due to timing dysfunctions rather than to any attempt at interruption.

The pattern of female callers being involved in more interruptions is not repeated with overlaps. Therefore, this effect is the result of increased successful and unsuccessful interruptions only.
Table 16  Summary of Analysis of Variance for rate of unsuccessful interruptions.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker</td>
<td>83.133</td>
<td>1</td>
<td>83.133</td>
<td>1.134</td>
<td>rs</td>
</tr>
<tr>
<td>Op sex</td>
<td>62.417</td>
<td>1</td>
<td>62.417</td>
<td>.851</td>
<td>rs</td>
</tr>
<tr>
<td>Caller sex</td>
<td>94.074</td>
<td>1</td>
<td>94.074</td>
<td>1.283</td>
<td>rs</td>
</tr>
<tr>
<td>Speaker Op sex</td>
<td>135.665</td>
<td>1</td>
<td>135.665</td>
<td>1.851</td>
<td>rs</td>
</tr>
<tr>
<td>Speaker Caller sex</td>
<td>3.390</td>
<td>1</td>
<td>3.390</td>
<td>.046</td>
<td>rs</td>
</tr>
<tr>
<td>Op sex Caller sex</td>
<td>.056</td>
<td>1</td>
<td>.056</td>
<td>.001</td>
<td>rs</td>
</tr>
<tr>
<td>Speaker Op sex Caller sex</td>
<td>97.325</td>
<td>1</td>
<td>97.325</td>
<td>1.328</td>
<td>rs</td>
</tr>
<tr>
<td>Residual</td>
<td>20819.853</td>
<td>284</td>
<td>73.309</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21306.308</td>
<td>291</td>
<td>73.218</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary of results
The following table summarises the results of the analyses of variance, giving the deviation from the mean for each main effect for each variable for which significant effects were found.

Table 17  Deviations from the grand mean on each variable for the three factors: speaker, operator sex and caller sex.

<table>
<thead>
<tr>
<th></th>
<th>Supplier</th>
<th>Operator sex</th>
<th>Caller sex</th>
<th>Supplier</th>
<th>Operator sex</th>
<th>Caller sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grand mean</td>
<td>58.38</td>
<td>1.92</td>
<td>1.81</td>
<td>2.13</td>
<td>-2.03</td>
<td></td>
</tr>
<tr>
<td>No words</td>
<td>-1.93</td>
<td>-2.03</td>
<td>-0.09</td>
<td>2.13</td>
<td>-2.03</td>
<td></td>
</tr>
<tr>
<td>Assent words</td>
<td>7.89</td>
<td>2.03</td>
<td>-0.23</td>
<td>0.09</td>
<td>-0.09</td>
<td></td>
</tr>
<tr>
<td>Interruptions</td>
<td>10.48</td>
<td>0.07</td>
<td>-0.47</td>
<td>0.23</td>
<td>-2.03</td>
<td></td>
</tr>
<tr>
<td>Successful Inter.</td>
<td>3.17</td>
<td>0.16</td>
<td>-0.08</td>
<td>0.69</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>Unsuccessful Inter.</td>
<td>2.14</td>
<td>0.56</td>
<td>-0.56</td>
<td>-0.57</td>
<td>0.54</td>
<td></td>
</tr>
</tbody>
</table>

a p<0.001 b p<0.01 c p<0.1
DISCUSSION
This study set out to examine one aspect of control, that is, turn management, and to look in particular at two issue: sex related and task related dominance. While turn management refers to how interactants organise taking turns at talking. As was discussed in Chapter 2 and briefly summarised above, this organisation of who speaks when and how the floor is gained has been linked to male dominance. Differences in turn management styles between men and women were therefore examined.

The status of interactants has also been related to the use of more dominant turn management styles with the higher status person having more access to the floor. In these conversations the main difference in status was that between operator and caller and was, therefore, role based. Task related dominance, that is control over the conversation in the interests of completing the conversation effectively was examined through differences between operators' and callers' speech styles.

Three aspects of turn management were examined here, the distribution of speech, the use of interruptions and the use of assent terms. Of these the first two were taken to be measures of dominance. Both dealt with access to the 'floor', the first dealing with the distribution of speech and the second with gaining the floor without waiting for a partner to complete their utterance. Assent terms are considered to be supportive as opposed to dominant, as they express agreement with and support for the recipient. It was expected that the dominant measure would be used more by men and by operators, while the supportive measure would be used more by women and callers.

The first measure to be considered was the distribution of interactions space, measure by the number of words spoken by each person in the dyad. The number of words spoken by operator and caller are equal, suggesting no attempt at dominance of the floor on either side. In fact, for functional, time dependent calls such as these, logic would suggest that the operator should speak less than the caller. In very efficient, short, calls this is often the case.
Operator  Fire Brigade
Caller   It's Radio Taxis here dear 2723030
Operator Yes
Caller   One of our mobiles reported a car on fire
Operator Yes
Caller   The corner of Regent's street
Operator Yes
Caller   and Carlton Street CARLTON
Operator Yes
Caller   South west one
Operator I see
Caller   OK dear
Operator OK thanks very much
Caller   And for your information it's the lower part of Regent's Street
Operator Thank you very much OK bye
Caller   bye

If the caller knows what information is required they can simply give this, item by item and the operator acknowledges receipt of each item. In the example given the caller is, in fact, another operator, familiar with the routine of conveying information over a telephone line. This means that the 999 operator can rely on information being offered in clear and orderly manner. The even distribution of speech in 999 calls in general points to the lack of such knowledge and skill among the general public. This also points to the fact that, while the caller is the informant, actually transferring this information requires a good deal of work on the part of the operator, beyond simply controlling the dynamics of who speaks when.

Unlike the findings of Leet-Pellegrini there was no evidence of a power effect, either between operators and callers or between men and women. Leet-Pellegrini suggests that the greater the assymetry in dyads, for example in mixed sex dyads with one expert, the more the relationship will be based on power. In these calls however, mixed sex dyads have longer interactions and in both types of dyad the caller speaks more than the operator. This does not suggest a situation where the operator takes charge of the interaction on the basis of power. This may be because the operator has no legitimate basis for power or the display of relationship dominance. This could be because the
caller sees the role of the operator as that of offering a service or because no relationship exists between caller and operator.

Further evidence that operators are not dominant in the conversation is given by the finding that operators use more assent words than callers regardless of sex and incident type, with 9.92% of operators' words being assent words compared to 5.86% of the callers'. Leet-Pellegrini (1980) found that the less powerful member of her dyads used more assent terms, except for female experts, who used more assent terms than male non-experts. In this study the use of assent terms is not related to sex and seems to be role determined. The use of assent words appears to be fundamental to operator style. Since, as there is no relationship between the use of assent words by the two parties, it does not appear to be influenced by the behaviour of the caller.

The operator therefore uses supportive utterances whether or not this is reciprocated by the caller. This use of words such as "yes", "mm-hmm" and so on can be seen to stem from the operator's task as information gatherer. While the operator may often repeat information back to the caller for acceptance or rejection it is the operator who most often must acknowledge the receipt of information. Used in this manner assent words can have three tasks: to acknowledge the caller's speech, to signal that that information has now been dealt with and the topic should change (Jefferson, 1972) and, finally, to offer emotional support. Therefore these utterances can be both supportive and controlling at the same time.

Male and female operators did not differ in their use of interruptions, but both operator and caller interrupted more when the caller was a woman. This was true for both successful and unsuccessful interruptions, but not for overlaps where there were no role or sex differences. In other words, there is no sex difference apparent for the professionals, but there is a sex difference for callers. This finding suggests that operators may have a more homogeneous style, perhaps because for them telephone conversations are a matter of routine and a practical aspect of their work. This would suggest that, although the operators have no training in conversational skills they
nevertheless adopt a role-based speech style. Further aspects of this style will be examined in later chapters.

The two noticeable features of operator style then are the use of assent terms, generally considered to be supportive, and that they speak as much as the caller. If assent terms were being used in an encouraging way this would indicate that the operator was listening, rather than that one particular piece of information had been received. This use of assent terms should, however, encourage the caller to speak more and this is not the what happens. It is suggested, therefore, that the operators’ use of these words and phrases may also have a function related more specifically to the task of information gathering, to indicated a change of topic. This use of assent terms will be dealt with in the next chapter.

A further feature of operator style is the lack of sex difference in their use of interruptions. This would not be remarkable were it not for the fact that there is a sex difference for callers, relating to both operators’ and callers’ use of interruptions. From table 3 above it can be seen that while the operator and caller’s rate of both successful and unsuccessful interruptions were correlated for the female-female dyads this was not the case for the male-female dyads. Therefore male operators are not simply responding to a higher rate of caller interruptions, though this may be the case for female operators.

In summary, only one hypothesis received partial support. Based on the findings from interruptions, women callers were less controlling than male callers, as they tended to be interrupted more. It should be noted, however, that women caller also tended to interrupt more than men. The finding for assent terms was the reverse of that predicted for role, with operators using more assent terms than callers. Finally, in amount of speech there was an interaction between operator and caller sex, with same sex pairs having shorter conversations than mixed sex pairs. The distribution of speech between partners did not, however, differ significantly across dyad type.
The discrepancy between these results and the literature may be explained by considering the task. While the operator is in one sense the expert in these conversations, his/her role is to glean specific information from the caller rather than to assert their dominance in a time-constrained task that is stressful for the caller. Therefore, the speech styles shown here appear to be attuned primarily to the particular conversational situation, the 999 call. A similar point is made by Shuy (1983) in a study of doctor-patient interaction. He points out that in the case of an interview the dominant partner does not to establish power, as they are already in total control by virtue of the nature of the interaction. Also, as the purpose of an interview is to elicit information, interruption is counter-productive. The same seems to be true here.
INTRODUCTION
Turn management is only one way of managing the course of a conversation. Gaining, retaining or yielding the floor can also be achieved by the use of various types of speech act (Thomas, Roger and Bull, 1983). For example, asking a question passes control of the conversation over to the person questioned. The person answering the question now has the right to finish answering without interruption. Any interruption at this point would be a greater violation than if the speaker had already completed one speech act, such as an offer, and was not embarking on a second (Murray 1985). Thus the use of speech acts may supercede turn management strategies by conferring rights which increase the extent to which an interruption is a violation.

This study concentrates on speech content and the manner in which it is presented. As the interactions being studied are highly circumscribed so is the content of the speech. The calls revolve around the incident being reported and the interaction is largely taken up with the transfer of information about that incident, rather than with opinions, ideas or feelings. Therefore, if the content is looked at in abstract terms it has a limited range. There is also less embellishment of topics or themes than in everyday conversation because of time constraints. These are interactions with much tighter structure than rambling conversations, indeed they have a strict agenda, even if this is known by only one party. The simplest emergency call (see example in Chapter 6) is very simple indeed, both in terms of the content type and the form in which it is presented.

Since most of the content of these interactions is information, control of the conversation may be expected to rest on how and when that information is transferred. First the speech acts used in this type of interaction will be examined looking in particular at the usage of those acts which can influence the course of the conversation. Secondly the sequence in which the operator asks for information will be examined to see whether there is evidence that
they are attempting to mould the conversation to their agenda. Finally the influence of role and sex on the style of information transfer will be examined.

Thomas Roger and Bull (1983) identified those speech acts which are important in the turn-taking mechanism of a conversation. They examined seven of the possible 12 categories of the Conversational Exchange Analysis (CEA) activity dimension;

- Offers, introducing information, opinions etc.
- Replies, a direct response to a Request
- Consents, acceptance, agreement and positive evaluation
- Dissents, rejection, disagreement and negative evaluation
- Modification, revise a prior idea
- Reaction, listener responses and unsuccessful/butting-in interruptions
- Requests, actively asking for information

These seven acts were further categorised into three types of 'state' on the basis of sequence analysis. Major states; offer, consent and reaction, accounted for 80% of acts in their speech sample and are the basic building blocks of conversation. These acts have more than one probable transition to them and fewer transitions from them. Therefore, the conversation is likely to cycle back to these acts. Minor states; reply, dissent, modify and request are acts which are more likely to have transitions from them than to them, they tend to produce transitions back to the major states. These acts add diversity to the conversation but they are not stable states. Initiator states; request, dissent and modify, have probable transitions from them but not to them. They lead to other types of act being used, but their occurrence can not be predicted in advance.

As regards the functions of different acts, offer, reply and dissent tend to retain the floor for the speaker while consent, reaction and request relinquish the speaking turn. The act Modify will retain the turn only if it is followed immediately by an offer by the same speaker.
Speech acts, therefore, have functions within the conversation beyond those involved in the carrying out of the acts themselves. Although the main function is the action, the secondary function is conversation or turn management.

It is this second function which is of interest here. The questions to be answered in this study are; which types of speech acts are used, in what sequence are they used and what implications does their usage have for conversation management. Further, are there sex and role differences in the usage of speech acts.

**METHOD**

In order to provide answers to these questions a random sample of 91 calls were broken down into acts. The usage and sequence of speech acts were then analysed for this sample as a whole. The sample was then broken down into between speaker and within speaker transitions. In order to examine role effects, differences between operator - caller and caller - operator transitions were then studied. Finally, the distribution of speech act types across sex were examined.

**Content analysis of speech**

The content analysis was based on Conversational Exchange Analysis. However, several modifications were made to the scheme to make it appropriate in this context. The conversations used by Thomas, Bull and Rogers were conducted in a laboratory setting, were concerned with given test materials and were terminated by the experimenter rather than by the conversationalists. Some categories in the CEA scheme refer directly to participants use of the test materials and are not needed here. It was also decided to include a category to cover conversation closings which would not have occurred in the experimental sample on which the scheme was based.

The interaction was broken down into units where each unit is defined as a single thought or idea and is roughly equivalent to an independent clause. Classification using CEA can be carried out on three levels; activity, type and
focus. This analysis concentrated on the activity classification. Activity is defined by Thomas et al as how information is made salient in the interaction. The CEA classification is based on three major classes of verbal interactive act; the statement, the question and the mand. These are distinguished both by their usual grammatical form, declarative, interrogative and jussive respectively, and by the situation or role the act plays at that point in the conversation. The inclusion of the situation is to allow for indirect speech acts.

A second way of thinking about how information is made salient is its direction as information moves from one person to the other. Wells, MacLure and Montgomery (1981) suggest that conversations are made up of acts which can be classified as 'give', 'solicit' or a third class 'acknowledge' which is neutral as to direction. Both statements and mands would count as 'give', request is a 'solicit' type, while consent, dissent and modify would be cases of 'acknowledge' in that they have to do with the evaluation of information received. The Wells et al classification was used as a superordinate structure within which the Thomas et al categories were restructured. For more detail of the coding scheme see Appendix A.

Table 1 Summary of Activity categories.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIVE</td>
<td></td>
</tr>
<tr>
<td>Offer</td>
<td>refers to speech which initiates conversation by introducing information, opinions etc.</td>
</tr>
<tr>
<td>Reply</td>
<td>refers to speech, that is, made by the other person in direct response to a request, where the information asked for is given</td>
</tr>
<tr>
<td>Insult</td>
<td>refers to acts that are verbally abusive</td>
</tr>
<tr>
<td>Mand</td>
<td>refers to speech that has the function of asking for an action to take place and is, therefore, an attempt by the speaker to get the listener to do something</td>
</tr>
<tr>
<td>Threat</td>
<td>is a specialised form of mand by which the speaker commits himself to some course of action, conditional on the listener doing or not doing a specified action</td>
</tr>
<tr>
<td>Phatic</td>
<td>introducing information, that is, conventional and ritualised</td>
</tr>
<tr>
<td>Open</td>
<td>ritualised speech used to open a conversation</td>
</tr>
<tr>
<td>Close</td>
<td>ritualised speech used to close a conversation</td>
</tr>
</tbody>
</table>
Chapter 7

SOLICIT
Request refers to speech in which a person is actively asking for information.
Query refers to speech in which a person asks about information already in the public domain.
? a request to have speech repeated.

ACKNOWLEDGE
Acknowledge subsumes the acknowledge, consent, reaction and listener responses categories and refers to positive or neutral acknowledgement of the other person's speech.
Modify refers to reflection, disagreement, negative evaluation or a suggested change to what the other speaker has said.

False starts refers to attempts at speech acts which are abandoned.
(Based on: Thomas, Bull and Roger 1982, p148)

'Give' categories
Phatics were subdivided into openings, closings and other phatics. In the Thomas et al study the conversation was terminated by the experimenter. We may assume that this is the reason why closings were not catered for in their classification system. As closings are ritualised but do not initiate conversation they were added as a separate category. To balance the classifications openings were also added as a category, leaving phatics to cover ritualised speech which occurs neither at the beginning nor at the end of the conversation.

'Solicit' categories
A distinction was made between requests, where a person is actively seeking new information and queries which have an interrogative form and which do solicit information but which are concerned with clarification for information already provided. A third category '?' refers to requests for repetition.

'Acknowledge' categories
Two categories of acknowledgement; acknowledge and modify are used. The first of these is neutral or positive while the second is negative. The main
difference between these two categories is that the second suggests that a change is needed whereas the first does not.

**Analysis**

When all utterances were classified a transition matrix was produced of operator-operator, operator-caller, caller-caller and caller-operator transitions. This matrix was analysed using binomial sequence analysis from the Behaviour Sequence Analysis Package: BESAP-1 (Hammond 1987) to look at the distribution of transitions across the possible act pairs.

**RESULTS**

1. **Total sample**

A total of 2538 speech acts were used in the corpus. The most frequently used category was Acknowledge, followed by Offer, Request, Reply and Close (see table 2). While Thomas, Bull and Roger found that 80% of the speech acts in their corpus were Offer, Consent and Reaction the equivalent percentage in these calls is 42.6%. This suggests that these conversations have a different structure and may be more diverse. Insult and Threat did not appear in this corpus.

Table 2 Distribution of speech acts for the total sample.

<table>
<thead>
<tr>
<th>Act</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledge</td>
<td>655</td>
<td>25.81</td>
</tr>
<tr>
<td>Offer</td>
<td>427</td>
<td>16.82</td>
</tr>
<tr>
<td>Request</td>
<td>372</td>
<td>14.66</td>
</tr>
<tr>
<td>Reply</td>
<td>329</td>
<td>12.96</td>
</tr>
<tr>
<td>Close</td>
<td>298</td>
<td>11.74</td>
</tr>
<tr>
<td>Open</td>
<td>159</td>
<td>6.27</td>
</tr>
<tr>
<td>Query</td>
<td>115</td>
<td>4.53</td>
</tr>
<tr>
<td>?</td>
<td>84</td>
<td>3.31</td>
</tr>
<tr>
<td>False start</td>
<td>46</td>
<td>1.81</td>
</tr>
<tr>
<td>Modify</td>
<td>32</td>
<td>1.26</td>
</tr>
<tr>
<td>Mand</td>
<td>16</td>
<td>0.63</td>
</tr>
<tr>
<td>Phatic</td>
<td>5</td>
<td>0.20</td>
</tr>
<tr>
<td>Total</td>
<td>2538</td>
<td></td>
</tr>
</tbody>
</table>
Fifteen transitions had a probability of occurrence greater than chance at the 0.01 level of probability. A further two transitions were probable at the 0.05 level (see table 3). These transitions are presented graphically in figure 1.

Four categories were identified as major states, that is, there was more than one transition to them and fewer transition from them. These were Offer, Request, Acknowledge and Close and these acts made up 69.03% of all speech act occurrences. Six categories were identified as minor states, having more probable transition from them than to them. These were Open, Reply, Query, ?, False start, and Phatic.

Table 3 Z ratios for transition matrix based on the total sample.

<table>
<thead>
<tr>
<th></th>
<th>OPEN</th>
<th>OFFER</th>
<th>REPLY</th>
<th>MAND</th>
<th>REQUEST</th>
<th>QUERY</th>
<th>?</th>
<th>ACK</th>
<th>MOD</th>
<th>FS</th>
<th>CLOSE</th>
<th>PHATIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>26.99**</td>
<td>4.48**</td>
<td>0.00</td>
<td>0.00</td>
<td>-3.04**</td>
<td>-2.29*</td>
<td>-1.77</td>
<td>-2.79**</td>
<td>0.00</td>
<td>-0.36</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>OFFER</td>
<td>-3.09**</td>
<td>1.13</td>
<td>-7.36**</td>
<td>1.21</td>
<td>-1.99*</td>
<td>1.23</td>
<td>-1.33</td>
<td>4.21**</td>
<td>-1.49</td>
<td>0.72</td>
<td>-7.08**</td>
<td>0.00</td>
</tr>
<tr>
<td>REPLY</td>
<td>0.00</td>
<td>-2.67**</td>
<td>-6.28**</td>
<td>0.00</td>
<td>-3.20**</td>
<td>4.12**</td>
<td>0.14</td>
<td>7.42**</td>
<td>-0.57</td>
<td>0.52</td>
<td>-5.81**</td>
<td>-0.46</td>
</tr>
<tr>
<td>MAND</td>
<td>0.00</td>
<td>0.39</td>
<td>0.00</td>
<td>0.00</td>
<td>2.59**</td>
<td>-0.29</td>
<td>0.00</td>
<td>-0.86</td>
<td>0.68</td>
<td>0.00</td>
<td>-0.33</td>
<td>0.00</td>
</tr>
<tr>
<td>REQUEST</td>
<td>0.00</td>
<td>-4.77**</td>
<td>23.98**</td>
<td>-0.82</td>
<td>-6.76**</td>
<td>-2.02*</td>
<td>8.25**</td>
<td>-9.98**</td>
<td>-0.83</td>
<td>-1.28</td>
<td>-7.19**</td>
<td>1.36</td>
</tr>
<tr>
<td>QUERY</td>
<td>0.00</td>
<td>-2.14*</td>
<td>-0.73</td>
<td>-0.33</td>
<td>-3.95**</td>
<td>-1.75</td>
<td>-1.27</td>
<td>7.75**</td>
<td>6.57**</td>
<td>0.00</td>
<td>-3.45**</td>
<td>0.00</td>
</tr>
<tr>
<td>?</td>
<td>0.00</td>
<td>-2.50**</td>
<td>1.99*</td>
<td>0.00</td>
<td>7.88**</td>
<td>-1.26</td>
<td>0.36</td>
<td>-3.63**</td>
<td>1.40</td>
<td>-0.07</td>
<td>-2.46**</td>
<td>0.63</td>
</tr>
<tr>
<td>ACK</td>
<td>-4.71**</td>
<td>-1.81</td>
<td>-7.81**</td>
<td>0.27</td>
<td>4.23**</td>
<td>-2.37**</td>
<td>-4.87**</td>
<td>-8.24**</td>
<td>-1.05</td>
<td>-0.48</td>
<td>1.31</td>
<td>-0.47</td>
</tr>
<tr>
<td>MODIFY</td>
<td>0.00</td>
<td>0.40</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.13</td>
<td>0.03</td>
<td>0.00</td>
<td>2.15*</td>
<td>0.18</td>
<td>-0.11</td>
<td>-1.19</td>
<td>0.00</td>
</tr>
<tr>
<td>FALSE ST</td>
<td>0.00</td>
<td>5.18**</td>
<td>-1.06</td>
<td>0.38</td>
<td>0.64</td>
<td>-0.41</td>
<td>0.00</td>
<td>-1.56</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.69</td>
<td>0.00</td>
</tr>
<tr>
<td>CLOSE</td>
<td>-1.30</td>
<td>-3.29**</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.98**</td>
<td>-0.93</td>
<td>0.00</td>
<td>-1.10</td>
<td>0.00</td>
<td>-0.75</td>
<td>15.70**</td>
<td>0.00</td>
</tr>
<tr>
<td>PHATIC</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.74**</td>
<td>0.00</td>
<td>-2.95**</td>
<td>0.00</td>
<td>-0.65</td>
<td>0.00</td>
<td>0.00</td>
<td>0.09</td>
<td>19.67**</td>
<td>0.00</td>
</tr>
</tbody>
</table>

** Indicates probability > 0.01
* Indicates probability > 0.05

Chi square = 4563.242
Degrees of freedom = 109
2-tailed probability= 0.0000
2 Between speakers
The most frequently used categories as first part of a between speaker exchange were Request (20.45%), Offer (16.61), Reply (16.14%) and Acknowledge (16.08%) (table 4).

Table 4 Distribution of speech acts leading to between speaker and within speaker transitions.

<table>
<thead>
<tr>
<th>Act</th>
<th>Between speakers</th>
<th>Within speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>Open</td>
<td>124</td>
<td>7.23</td>
</tr>
<tr>
<td>Offer</td>
<td>285</td>
<td>16.61</td>
</tr>
<tr>
<td>Reply</td>
<td>277</td>
<td>16.14</td>
</tr>
<tr>
<td>Mand</td>
<td>4</td>
<td>0.23</td>
</tr>
<tr>
<td>Request</td>
<td>351</td>
<td>20.45</td>
</tr>
<tr>
<td>Query</td>
<td>112</td>
<td>6.53</td>
</tr>
<tr>
<td>?</td>
<td>78</td>
<td>4.55</td>
</tr>
<tr>
<td>Acknowledge</td>
<td>276</td>
<td>16.08</td>
</tr>
<tr>
<td>Modify</td>
<td>21</td>
<td>1.22</td>
</tr>
<tr>
<td>False start</td>
<td>23</td>
<td>1.34</td>
</tr>
<tr>
<td>Close</td>
<td>95</td>
<td>5.54</td>
</tr>
<tr>
<td>Phatic</td>
<td>70</td>
<td>4.08</td>
</tr>
</tbody>
</table>
Fifteen transitions had an above chance probability of occurrence between speakers (see table 5). Two acts were major states, Offer with three probable transitions to it and one from it and Acknowledge which had four probable transition to it and only one from it.

Table 5  
Z ratios for transition matrix based on between speaker transitions.

<table>
<thead>
<tr>
<th></th>
<th>OPEN</th>
<th>OFF</th>
<th>REPLY</th>
<th>MAND</th>
<th>REQ.</th>
<th>QUERY</th>
<th>?</th>
<th>ACK.</th>
<th>MOD.</th>
<th>F.S.</th>
<th>CLOSE</th>
<th>PHATIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>25.13**</td>
<td>4.07**</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.65</td>
<td>-3.16*</td>
<td>-1.84</td>
<td>-3.38**</td>
<td>0.00</td>
<td>-0.66</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>OFF</td>
<td>-2.85**</td>
<td>-4.84**</td>
<td>0.00</td>
<td>0.79</td>
<td>1.35</td>
<td>2.27*</td>
<td>-0.98</td>
<td>5.19**</td>
<td>-1.30</td>
<td>0.39</td>
<td>-3.70**</td>
<td>0.00</td>
</tr>
<tr>
<td>REPLY</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>4.11**</td>
<td>-0.08</td>
<td>5.20**</td>
<td>-1.25</td>
<td>0.91</td>
<td>-2.92**</td>
<td>-2.55**</td>
</tr>
<tr>
<td>MAND</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.15</td>
<td>0.00</td>
<td>0.00</td>
<td>0.03</td>
<td>1.70</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>REQUEST</td>
<td>0.00</td>
<td>-2.04*</td>
<td>18.90**</td>
<td>0.00</td>
<td>-6.10**</td>
<td>-3.01**</td>
<td>5.81**</td>
<td>-12.38**</td>
<td>-1.38</td>
<td>-1.01</td>
<td>0.00</td>
<td>-3.10**</td>
</tr>
<tr>
<td>QUERY</td>
<td>0.00</td>
<td>-0.32</td>
<td>-1.95</td>
<td>0.42</td>
<td>0.00</td>
<td>-1.96*</td>
<td>-1.67</td>
<td>4.87**</td>
<td>5.40**</td>
<td>0.00</td>
<td>-2.06*</td>
<td>0.00</td>
</tr>
<tr>
<td>?</td>
<td>0.00</td>
<td>-0.86</td>
<td>0.48</td>
<td>0.00</td>
<td>11.57**</td>
<td>-1.41</td>
<td>-1.13</td>
<td>-4.49**</td>
<td>1.01</td>
<td>0.14</td>
<td>-1.04</td>
<td>-0.52</td>
</tr>
<tr>
<td>ACK.</td>
<td>0.00</td>
<td>5.85**</td>
<td>-3.25**</td>
<td>-0.30</td>
<td>0.03</td>
<td>-1.54</td>
<td>-3.20**</td>
<td>-1.94</td>
<td>0.06</td>
<td>0.06</td>
<td>0.08</td>
<td>0.00</td>
</tr>
<tr>
<td>MODIFY</td>
<td>0.00</td>
<td>-0.39</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.45</td>
<td>0.31</td>
<td>0.00</td>
<td>2.43**</td>
<td>0.26</td>
<td>0.26</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>FALSE ST</td>
<td>0.00</td>
<td>6.80**</td>
<td>-1.31</td>
<td>0.74</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.38</td>
<td>0.00</td>
<td>0.00</td>
<td>0.12</td>
<td>0.00</td>
</tr>
<tr>
<td>CLOSE</td>
<td>0.00</td>
<td>-0.07</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.10*</td>
<td>-0.43</td>
<td>0.00</td>
<td>-0.70</td>
<td>0.00</td>
<td>-0.11</td>
<td>0.00</td>
<td>24.88**</td>
</tr>
<tr>
<td>PHATIC</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.17*</td>
<td>0.00</td>
<td>-0.98</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>30.71**</td>
<td>0.00</td>
</tr>
</tbody>
</table>

** Indicates probability > 0.01  
* Indicates probability > 0.05

Chi square = 4012.051  
Degrees of freedom= 109  
2-tailed probability = 0.0000
3 Within speakers

The acts which most frequently led to speech acts by the same speaker were Acknowledge (52.22%) and Offer (18.33%).

Ten within speaker transitions had probabilities above chance level (see table 6). Of these transitions two, Offer and Phatic counted as major states.

Table 6 Z ratios for transition matrix based on within speaker transitions.

<table>
<thead>
<tr>
<th>OPEN</th>
<th>OFFER</th>
<th>REPLY</th>
<th>MAND</th>
<th>REQ.</th>
<th>QUERY</th>
<th>?</th>
<th>ACK.</th>
<th>MOD.</th>
<th>F.S.</th>
<th>CLOSE</th>
<th>PHATIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>5.08**</td>
<td>3.54**</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.08*</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.48</td>
<td>0.00</td>
<td>-0.35</td>
<td>0.00</td>
</tr>
<tr>
<td>OFFER</td>
<td>0.00</td>
<td>4.70**</td>
<td>0.91</td>
<td>0.69</td>
<td>-4.30**</td>
<td>-1.42</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.48</td>
<td>-5.35**</td>
</tr>
<tr>
<td>REPLY</td>
<td>0.00</td>
<td>4.95**</td>
<td>3.15**</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.81</td>
<td>0.13</td>
<td>-3.18**</td>
</tr>
<tr>
<td>MAND</td>
<td>0.00</td>
<td>-0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.19</td>
<td>0.28</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.66</td>
</tr>
<tr>
<td>REQUEST</td>
<td>0.00</td>
<td>-0.31</td>
<td>0.00</td>
<td>0.20</td>
<td>0.52</td>
<td>1.10</td>
<td>0.86</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.50</td>
</tr>
<tr>
<td>QUERY</td>
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<td>0.37</td>
<td>1.26</td>
<td>0.00</td>
<td>-0.36</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>?</td>
<td>0.00</td>
<td>0.00</td>
<td>3.25**</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>13.18**</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>ACK.</td>
<td>-1.38</td>
<td>-16.73**</td>
<td>-4.52**</td>
<td>-1.84</td>
<td>-5.28**</td>
<td>-1.38</td>
<td>-1.70</td>
<td>-0.95</td>
<td>-0.46</td>
<td>-1.93</td>
<td>-5.46**</td>
</tr>
<tr>
<td>MODIFY</td>
<td>0.00</td>
<td>0.91</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.17</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.43</td>
</tr>
<tr>
<td>FALSE ST</td>
<td>0.00</td>
<td>0.54</td>
<td>0.92</td>
<td>0.23</td>
<td>-0.17</td>
<td>-0.13</td>
<td>1.23</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>9.34**</td>
</tr>
<tr>
<td>CLOSE</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.13*</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>PHATIC</td>
<td>0.00</td>
<td>0.00</td>
<td>1.26</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.17</td>
</tr>
</tbody>
</table>

** Indicates probability > 0.01
* Indicates probability > 0.05

Chi square = 7487.147
Degrees of freedom = 109
2-tailed probability= 0.0000

Within and between speaker transitions are compared in figure 2, where each act is represented by an oval, probable transitions between acts with an arrow and probable transitions to the same act by a loop. This shows that Request, Query, Acknowledge, Modify and False start led to a between speaker transition and therefore to a turn switch more often than to an act by the
same speaker. The act '? ' tended to lead to a second act by the same speaker.
All other acts had an equal number of probable transitions within and
between speakers.

**Figure 2** Between and within speaker transitions.

![Diagram showing speech act transitions]

Note: Solid lines indicate between speaker transitions, shaded lines indicate within speaker transitions.

The distribution of speech acts which led to within and between speaker transitions are significantly different ($\chi^2 = 485.4$, df = 11, p<0.01, see table 7). This shows that, while Acknowledge does not have any probable transition from it within a speaker's turn, it is used proportionally more often than in between speaker exchanges. Open, Reply, Request, Query, ?, and Phatic are used more often in between speaker exchanges.
Chapter 7

Table 7  Number of speech acts leading to probable between and within speaker transitions.

<table>
<thead>
<tr>
<th>Act</th>
<th>Between speakers</th>
<th>Within speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Offer</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Reply</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mand</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Request</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Query</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Acknowledge</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Modify</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>False start</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Close</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Phatic</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

4 Differences between operators and callers

Table 8 shows the distribution of speech act types used by operator and caller compared with the total sample. Operators and callers differ significantly in the acts they use ($\chi^2 = 1113.0, p<0.001$). Operators used Open, Request, Query, Acknowledge and Close more than did callers. Callers used Offer, Reply, ?, and Modify more than operators. In summary, operators solicit and acknowledge, while callers offer and use negative acknowledgements.

There were ten significantly probable transitions from operator to caller (table 9) and six probable transitions from caller to operator (table 10). A comparison of operator - caller and caller - operator transition is given in figure 3.
Figure 3  Operator to caller and caller to operator transitions.

Note: Solid lines indicate operator to caller transitions, shaded lines indicate caller to operator transitions

Table 8  Distribution of speech acts for operators and caller compared to the total sample.

<table>
<thead>
<tr>
<th>Act</th>
<th>Total</th>
<th>Operator</th>
<th>Caller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq</td>
<td>%</td>
<td>Freq</td>
</tr>
<tr>
<td>Open</td>
<td>159</td>
<td>6.27</td>
<td>104</td>
</tr>
<tr>
<td>Offer</td>
<td>427</td>
<td>16.82</td>
<td>49</td>
</tr>
<tr>
<td>Reply</td>
<td>329</td>
<td>12.96</td>
<td>1</td>
</tr>
<tr>
<td>Mand</td>
<td>16</td>
<td>0.63</td>
<td>8</td>
</tr>
<tr>
<td>Request</td>
<td>372</td>
<td>14.66</td>
<td>351</td>
</tr>
<tr>
<td>Query</td>
<td>115</td>
<td>4.53</td>
<td>104</td>
</tr>
<tr>
<td>?</td>
<td>84</td>
<td>3.31</td>
<td>31</td>
</tr>
<tr>
<td>Acknowledge</td>
<td>655</td>
<td>25.81</td>
<td>457</td>
</tr>
<tr>
<td>Modify</td>
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<td>9</td>
</tr>
<tr>
<td>False start</td>
<td>46</td>
<td>1.81</td>
<td>27</td>
</tr>
<tr>
<td>Close</td>
<td>298</td>
<td>11.74</td>
<td>205</td>
</tr>
<tr>
<td>Phatic</td>
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<td>0.20</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>2538</td>
<td></td>
<td>1349</td>
</tr>
</tbody>
</table>
Table 9  
Z ratios for transition matrix based on operator to caller transitions.

<table>
<thead>
<tr>
<th></th>
<th>OPEN</th>
<th>OFFER</th>
<th>REPLY</th>
<th>REQ</th>
<th>QUERY</th>
<th>?</th>
<th>ACK</th>
<th>MOD</th>
<th>FS</th>
<th>CLOSE</th>
<th>PHAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>15.92**</td>
<td>1.83</td>
<td>0.00</td>
<td>2.87**</td>
<td>-0.12</td>
<td>-1.96</td>
<td>-1.00</td>
<td>0.00</td>
<td>0.34</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>OFFER</td>
<td>0.00</td>
<td>-1.36</td>
<td>0.00</td>
<td>0.00</td>
<td>0.22</td>
<td>0.90</td>
<td>5.44**</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>REQUEST</td>
<td>0.00</td>
<td>-7.16**</td>
<td>4.28**</td>
<td>-1.49</td>
<td>0.15</td>
<td>1.96*</td>
<td>-11.43**</td>
<td>-2.83**</td>
<td>-0.46</td>
<td>0.00</td>
<td>0.23</td>
</tr>
<tr>
<td>QUERY</td>
<td>0.00</td>
<td>-2.75**</td>
<td>-4.30**</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.96</td>
<td>8.65**</td>
<td>4.38**</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>?</td>
<td>0.00</td>
<td>-0.25</td>
<td>1.74</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.14</td>
<td>-1.21</td>
<td>2.27*</td>
<td>0.00</td>
<td>0.00</td>
<td>1.69</td>
</tr>
<tr>
<td>ACK</td>
<td>0.00</td>
<td>4.63**</td>
<td>-4.31**</td>
<td>0.16</td>
<td>0.00</td>
<td>-2.97**</td>
<td>0.94</td>
<td>-0.01</td>
<td>0.33</td>
<td>-3.19**</td>
<td>0.00</td>
</tr>
<tr>
<td>MODIFY</td>
<td>0.00</td>
<td>-0.24</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.65</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>FS</td>
<td>0.00</td>
<td>5.72**</td>
<td>-1.75</td>
<td>0.73</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.14</td>
<td>0.00</td>
</tr>
<tr>
<td>CLOSE</td>
<td>0.00</td>
<td>0.28</td>
<td>0.00</td>
<td>0.00</td>
<td>2.29*</td>
<td>0.00</td>
<td>5.84**</td>
<td>0.00</td>
<td>0.07</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>PHATIC</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.37</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>24.88**</td>
<td>0.00</td>
</tr>
</tbody>
</table>

** Indicates probability > 0.01
* Indicates probability > 0.05
Chapter 7

Table 10  Z ratios for transition matrix based on caller to operator transitions.

<table>
<thead>
<tr>
<th></th>
<th>OPEN</th>
<th>OFFER</th>
<th>REPLY</th>
<th>MAND</th>
<th>REQUEST</th>
<th>QUERY</th>
<th>?</th>
<th>ACK</th>
<th>MOD</th>
<th>FS.</th>
<th>CLOSE</th>
<th>PHATIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>-1.14</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.12*</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>OFFER</td>
<td>-0.41</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.23</td>
<td>-3.76**</td>
<td>-1.39</td>
<td>-0.97</td>
<td>-2.50**</td>
<td>-0.59</td>
<td>-0.38</td>
<td>-5.25**</td>
<td>0.00</td>
</tr>
<tr>
<td>REPLY</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-5.46**</td>
<td>-0.59</td>
<td>0.17</td>
<td>-2.72**</td>
<td>-0.74</td>
<td>-0.30</td>
<td>-5.04**</td>
<td>0.01</td>
</tr>
<tr>
<td>MAND</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.33</td>
<td>0.00</td>
<td>0.00</td>
<td>0.32</td>
<td>2.35*</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>REQUEST</td>
<td>0.00</td>
<td>0.00</td>
<td>6.41**</td>
<td>0.00</td>
<td>-0.18</td>
<td>0.10</td>
<td>3.09**</td>
<td>-0.65</td>
<td>0.99</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>QUERY</td>
<td>0.00</td>
<td>5.31**</td>
<td>0.00</td>
<td>1.74</td>
<td>0.00</td>
<td>0.20</td>
<td>0.00</td>
<td>-0.08</td>
<td>0.00</td>
<td>0.00</td>
<td>0.32</td>
<td>0.00</td>
</tr>
<tr>
<td>?</td>
<td>0.00</td>
<td>-0.30</td>
<td>0.71</td>
<td>0.00</td>
<td>9.68**</td>
<td>-1.61</td>
<td>0.00</td>
<td>-4.80**</td>
<td>0.00</td>
<td>0.27</td>
<td>-1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>ACK</td>
<td>0.00</td>
<td>0.44</td>
<td>0.00</td>
<td>-0.17</td>
<td>1.12</td>
<td>-0.36</td>
<td>-1.29</td>
<td>-2.50**</td>
<td>0.21</td>
<td>-0.29</td>
<td>1.18</td>
<td>0.00</td>
</tr>
<tr>
<td>MODIFY</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.03</td>
<td>-0.14</td>
<td>0.00</td>
<td>0.91</td>
<td>0.82</td>
<td>0.17</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>FS.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.95</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.05</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>CLOSE</td>
<td>0.00</td>
<td>-0.35</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.30*</td>
<td>-1.71</td>
<td>0.00</td>
<td>-4.79**</td>
<td>0.00</td>
<td>0.00</td>
<td>17.85**</td>
<td>0.00</td>
</tr>
<tr>
<td>PHATIC</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.69</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

** Indicates probability > 0.01  
* Indicates probability > 0.05

Chi square = 6563.91  
Degrees of freedom = 109  
2-tailed probability = 0.0000

5  Differences between males and females in their use of speech acts.
As there were more female operators than male in the sample the sex and role of the speaker are confounded in this study. Therefore, a comparison of the usage of speech acts by males and females was made within role, that is, male callers were compared with female callers and male operators with female operators. No significant sex differences were found. For callers $\chi^2 = 10.26$, df = 11; for operators $\chi^2 = 15.14$, df = 11.

DISCUSSION
If major states are the building blocks of conversation then these conversations are built on Offer, Request, Acknowledge and Close. These acts together make up nearly 70% of all acts used. Close, an act type added for this study, acts as a major state because once the call is declared to be ended there is little likelihood that it will continue. Although this seems obvious it is not
necessarily the case in all conversations, particularly those which are informal, as conversation can and does restart after one or both parties have said goodbye. As these conversations are built around a task they finish as soon as that task is completed.

In these calls Request acts as a major state, which it did not in the Thomas et al study. Thomas et al state that "the basic process of conversation and discussion is simply concerned with the imparting of information and ideas" p185. The findings of this study suggest that the basic process is in fact situation specific. In these calls the basic process appears to be interrogative. This will not be the case in all conversations. Concentrating on the imparting of information implies that the main route for making information salient is through the use of an Offer. In these interactions, because the task requires an agenda, information must also be solicited and this need marks out the style and structure of the speech.

The importance of acknowledgement, that is, positive or neutral reactions to the receipt of information, is noteworthy. This ties in with the use of assent terms by the operator (Chapter 6) and the difficulties of conversing in a sound only channel (Chapter 5). Acknowledge is a common response. It does not lead specifically to any other speech act. In the same way Offer is used either as a response or as a continuation of a speaker's turn. Thus Offer may follow Open, whether by self or the other speaker, suggesting that the beginning of the conversation has an expositional character. It may follow Acknowledgement so that the speaker will offer new information when given a signal that the previous piece of information has been dealt with. Interestingly, it is a likely successor to a False start by the other speaker. In other words, if one person has difficulty in articulation the second speaker may curtail the first speaker's turn by offering information rather than allowing them a second chance at the speech intended. The operator is more likely to produce False starts than the caller. This tendency to curtail False starts may therefore link in with the greater number of successful interruptions used by caller (see chapter 6).
Request leads to Reply or to '?' which may in turn lead to a Reply by the same person. As the category '?' may be usefully translated as "Pardon?" this diversion between Request and Reply may be another manifestation of hearing difficulties. The hearer is initially unsure of the question, but then replies, presumably as the question is properly understood without further intervention by the questioner. Just as a Request by one person can lead to a '?' by the second, so a '?' can lead to a Request. This suggests that there are a number of cases where the Request cannot be understood and it must be repeated. There is a low probability for Offers or other acts being followed by '?'. Therefore, it is only Requests which are liable to be misunderstood.

Replies can lead either to immediate Acknowledgement or to Queries. Unlike Requests for new information, Queries about information already in the public domain may simply be either confirmed or disconfirmed (Acknowledge or Modify). This suggests some need for the immediate clarification of the replies given. A Query is more specific than a '?' in that in a Query specific information is addressed.

Close and Phatic have a tendency to lead to each other, suggesting that ritualised speech is used to signal the end of the call.

The six acts Open, Offer, Reply, '?', Close, and Phatic have a significant probability of being repeated by the same speaker. Therefore, any of those acts (Open, Request, Acknowledge, or Phatic) which lead to the second speaker using one of these will have a probability of relinquishing the floor for more than one act.

Of the four major states, Offer, Request, Acknowledge and Close, only Offer is used more by the caller than by the operator. Therefore, the major states, the basic building blocks of the conversation, are largely in the repertoire of the operator. If the operator uses one of these acts there is a probable transition to at least one act by the caller, Request to Reply, Acknowledge to Offer, Close to Acknowledge. These callers' speech acts can therefore be predicted in advance. In contrast, there are no probable transitions following a caller's
Offer. The operator uses acts which lead to predictable responses from the caller, while the caller uses an act with an unpredictable response. Therefore, the caller’s speech is structured by the operator more than vice versa. This finding is important. While the operator may respond to the content of the caller’s speech she does not react to the style in which that content is presented.

The action of control in these conversations, therefore, is not in using acts which retain the floor. As time is a crucial factor in the calls retaining the floor could well be counter-productive. Instead there seems to be an element of control in shaping the flow of the conversation, in determining what will happen next. This control lies in the hands of the operator as the operator is proactive while the caller is reactive.

An important feature of the operator’s conversational style, both because of its frequency and because of the control exerted over the caller’s next utterance is the use of acts which solicit information. In the next chapter the operator’s use of these acts will be examined, concentrating on the content of the speech rather than on the style, on what is being solicited rather than on how it is solicited.
INTRODUCTION

In the last chapter it was found that the operator used acts to solicit information more than did the caller. Furthermore, by using a Request the operator made it likely that the caller would use a Reply. In this way the operator can influence not only the turn change and conversational style but also the content of the caller's utterance. A Reply is defined as speech in direct response to a request where the information asked for is given. Therefore, when an operator is concerned with one item of information and Requests it of the caller, the topic of conversation is likely to be carried on by the caller.

A study of calls to the police (Stech, 1975) showed that the call was structured around the questions asked, either by the police or the caller, depending on the incident. Stech also suggested that in a highly circumscribed role situation especially where one role is dominant, one of the actors will influence the interaction in such a way as to produce a stronger structure. Something similar appears to happen with the calls in this study. However, Shuy (1983), in a study of 100 medical interviews following a written questionnaire format found that this format could not be reconstructed from the interview sequence. There was great variability in which topics were covered and in the questions asked.

If the conversation can be steered by the operator's Requests the question arises as to whether this structure is only at the level of adjacent turns of speech or whether individual requests fit into a larger pattern which might influence the call over a longer period. One possibility for this longer term pattern would be if the operator had an agenda for the call. If this were so the extent of the operator's control over the direction of the interaction might be reflected in the extent to which s/he moved from item to item in a fixed order. In all calls the operator needs five pieces of information, the incident type, the address including postal district, the nearest side street or vehicular access, the telephone number and whether there are people involved. If the
operator has an implicit schedule or agenda then this should show up in the sequence of questions asked. No assumptions need be made about the order in which items are addressed, the question is simply whether there is an order which is discernible across a number of interactions.

**METHOD**

It was decided therefore to examine any possible structure imposed on the call by the operator in terms of her/his task, that is, in terms of how s/he went about eliciting the information needed. The questions asked by the operator in 92 calls (the 15 longest, 15 shortest and 62 randomly selected calls) were listed in sequence. Only questions were coded, all intervening speech was ignored. These questions were categorised according to the type of information asked for.

1. Address
2. Postal district
3. Incident type
4. Whether there were people involved
5. Nearest side street or vehicular access
6. Telephone number

Three further categories of question were coded which were questions related to information given earlier in the call.

7. Spelling
8. Request for clarification
9. Request for additional information

The beginning and end of the sequence were also coded

There were insufficient occurrences of questions about number four to permit meaningful analysis. This item was therefore dropped from the analysis. Question types eight and nine were collapsed to reduce the number of cells with expected values less than five.

A first order transition matrix was then constructed which recorded the frequency with which one category followed any other. This matrix was
analysed using binomial sequence analysis from the Behaviour Sequence Analysis Package: BESAP-1 (Hammond 1987).

RESULTS
Table 1 gives the probability of transitions between categories. The Chi-square for the whole table was significant, indicating that the antecedent and subsequent behaviours were not independent. The majority of significant transitions were not between one question and another, but between repeated instances of the same question.

Table 1  
Z ratios for transitions between question types.

<table>
<thead>
<tr>
<th></th>
<th>END</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8/9</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEGIN</td>
<td>0.00</td>
<td>6.04**</td>
<td>-1.36</td>
<td>-0.05</td>
<td>-2.73**</td>
<td>0.00</td>
<td>-0.40</td>
<td>0.87</td>
</tr>
<tr>
<td>1</td>
<td>-2.87**</td>
<td>0.00</td>
<td>0.48</td>
<td>-0.15</td>
<td>0.78</td>
<td>-1.56</td>
<td>1.38</td>
<td>1.85</td>
</tr>
<tr>
<td>2</td>
<td>-1.19</td>
<td>-2.64**</td>
<td>0.00</td>
<td>0.37</td>
<td>1.59</td>
<td>6.14**</td>
<td>-1.35</td>
<td>-2.88**</td>
</tr>
<tr>
<td>3</td>
<td>0.07</td>
<td>0.92</td>
<td>-0.15</td>
<td>0.00</td>
<td>-0.16</td>
<td>0.13</td>
<td>-0.93</td>
<td>-0.33</td>
</tr>
<tr>
<td>5</td>
<td>-0.14</td>
<td>-1.86</td>
<td>-0.32</td>
<td>-0.22</td>
<td>0.00</td>
<td>-0.44</td>
<td>0.07</td>
<td>2.94**</td>
</tr>
<tr>
<td>6</td>
<td>8.29**</td>
<td>-1.99*</td>
<td>-1.70</td>
<td>0.00</td>
<td>-1.42</td>
<td>0.00</td>
<td>-0.24</td>
<td>-0.79</td>
</tr>
<tr>
<td>7</td>
<td>0.15</td>
<td>-0.91</td>
<td>1.50</td>
<td>0.00</td>
<td>0.28</td>
<td>0.34</td>
<td>0.00</td>
<td>0.24</td>
</tr>
<tr>
<td>8/9</td>
<td>-0.86</td>
<td>-0.48</td>
<td>1.63</td>
<td>0.84</td>
<td>0.38</td>
<td>-1.55</td>
<td>0.46</td>
<td>0.00</td>
</tr>
</tbody>
</table>

To see whether there was a sequential structure underlying the repetition of questions the diagonal of the transition matrix and the matrix of expected cell values were set to zero. The matrix was then analysed using binomial sequence analysis for matrices of reduced rank (Hammond 1987). Table 2 gives probabilities for each cell of this matrix.
### Table 2  
**Z ratios for the reduced rank matrix of transitions between question types.**

<table>
<thead>
<tr>
<th></th>
<th>END</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8/9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BEGIN</strong></td>
<td>0.00</td>
<td>6.04**</td>
<td>-1.36</td>
<td>-0.05</td>
<td>-2.73**</td>
<td>0.00</td>
<td>-0.40</td>
<td>0.87</td>
</tr>
<tr>
<td>1</td>
<td>-2.87**</td>
<td>0.00</td>
<td>0.48</td>
<td>-0.15</td>
<td>0.78</td>
<td>-1.56</td>
<td>1.38</td>
<td>1.85</td>
</tr>
<tr>
<td>2</td>
<td>-1.19</td>
<td>-2.66**</td>
<td>0.00</td>
<td>0.37</td>
<td>1.59</td>
<td>6.14**</td>
<td>-1.35</td>
<td>-2.88**</td>
</tr>
<tr>
<td>3</td>
<td>0.07</td>
<td>0.92</td>
<td>-0.15</td>
<td>0.00</td>
<td>-0.16</td>
<td>0.13</td>
<td>-0.93</td>
<td>-0.33</td>
</tr>
<tr>
<td>5</td>
<td>-0.14</td>
<td>-1.86</td>
<td>-0.32</td>
<td>-0.22</td>
<td>0.00</td>
<td>-0.44</td>
<td>0.07</td>
<td>2.94**</td>
</tr>
<tr>
<td>6</td>
<td>8.29**</td>
<td>-1.99*</td>
<td>-1.70</td>
<td>0.00</td>
<td>-1.42</td>
<td>0.00</td>
<td>-0.24</td>
<td>-0.79</td>
</tr>
<tr>
<td>7</td>
<td>0.15</td>
<td>-0.91</td>
<td>1.50</td>
<td>0.00</td>
<td>0.28</td>
<td>0.34</td>
<td>0.00</td>
<td>0.24</td>
</tr>
<tr>
<td>8/9</td>
<td>-0.86</td>
<td>-0.48</td>
<td>1.63</td>
<td>0.84</td>
<td>0.38</td>
<td>-1.55</td>
<td>0.46</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**CHI SQUARE** = 296.9705  
**DEGREES OF FREEDOM** = 41  
**2-TAILED PROBABILITY** = 0.0000

### DISCUSSION

Questions are often repeated and a good deal of checking of information can occur. Checking may be of several types, repetition of the callers words with a rising or falling intonation, paraphrasing the callers’ words, querying information given and so on. There seems to be constant negotiation of the information given.

There were four transitions of above chance probability. Questions about the address were most likely to be at the beginning of the interaction. Questions about the postal district were followed by questions about the telephone number which in turn were followed by the end of the interaction. Questions about the nearest side street were followed by requests for clarification. There therefore seems to be some control exerted over the beginning and end of the conversation with the intervening section presumably dictated by circumstances. This would seem to replicate Shuy’s (1983) findings.

As in the last chapter the operator is found to have more influence over the opening and closing of the conversation. In the body of the interaction the control exerted by the operator through the use of Requests must be limited to pairs of turns only. The operator either does not wish to or cannot structure
the order in which information is addressed by soliciting information in a fixed sequence. One influence on whether an operator would want to solicit certain items must be what information the caller has already volunteered. Such information would be dealt with and should not need to be dealt with again. How the operator and caller deal with the content of their interaction, the information which passes between them, is the subject of the next chapter.
INTRODUCTION
In Chapter 7 it was shown that the operator does not control the sequence of information dealt with in the call using Requests. In this chapter the focus will be broadened to consider also the caller's involvement in transferring information by either volunteering it or by answering the operator's questions. The second role of the operator, that is, acknowledging the caller's information will also be considered.

The central task of these conversations is the transfer of information. While the caller may also hope for advice or reassurance the role of the operator is only to find out the address and pass these details on to the local fire station. Furthermore, this information must be given in a form that is appropriate to the needs of the operators and the system they administer. Road names are needed, landmarks and direction are of no use.

This transfer can only come about in two ways. Either the caller can volunteer the information unprompted, or the operator can ask the caller for the information. In both of these instances there can be a communication breakdown. In the first the operator may not hear or assimilate the information given. In the second the caller may not answer the operator's question, whether because the question has been misunderstood or because the caller does not have the information requested. There is also the possibility that a caller might not wish to answer a question. But since in these calls the caller wants assistance, which can only be obtained with his volunteering information, we may discount this third alternative.

For the transfer of information to be efficient two criteria should be met. First, there should be no communication breakdown. Second there should be as short a lapse as possible between the production of information and its acknowledgement or between the elicitation of information and its subsequent production. If a caller proffers information the most obvious way the operator has of signalling that it has been received is to explicitly
acknowledge it. This acknowledgement is not, however, absolutely necessary. On the other hand, if the operator asks for some information then an answer is required for the transfer of that information to be complete.

Until now the assumption has been made that all information can be considered equal. This is not necessarily true. It is already known for example that the operator tends to request the road name early in the conversation and the telephone number close to the end. Therefore different topics may be treated differently. The reason for this may stem from the knowledge the operator and caller have about the 999 call situation. While the operator knows exactly what information is required the caller only knows that the address and nature of the incident should be reported. S/he may not know that the operator is at a centralized control unit, possibly miles away and that s/he may have little local knowledge of the area from which s/he is ringing. Therefore, although s/he may realise that the road name and house name or number are required s/he may not realise the necessity for giving the postal district and even less that of the nearest side turning.

The differences between types of information have two implications. First, some pieces of information may be more readily transmitted than others and the transfer may therefore be more efficient. Second, the method of transfer may vary from item to item, that is, callers may volunteer certain pieces of information while other pieces may be elicited by the operator.

METHOD
Seventy-two calls were analysed. All were calls to fires and all were the first or only call to an incident. This second criterion was used because for all but the first call the operator has some information about the incident and may therefore ignore certain topics or dwell on others. For each call a note was made of how four topics were dealt with. These were: road name, house name or number, postal district and nearest side-turning or vehicular access. These together make up the address information needed by the operator. In the case of each topic four scores were entered, the turn this information was first offered by the caller, the turn it was first elicited by the operator, the turn
the operator's question was first answered and the first turn the operator acknowledged receipt of the information either by repeating the information or by affirmative utterances such as 'yes' or 'OK'. A note was also made of whether there were minor checks of any topic, i.e. spelling, requests for repetition, and whether there were major checks, i.e. the information was explicitly called into question. A note was also made of any topic abandoned before the operator had the information required. The different speech acts used in the transfer of information will be referred to as 'transfer acts'.

**RESULTS**

The frequency with which each transfer act was used to deal with each topic is given below.

**Table 1 Transfer mode by topic presented as frequency and percentage of transfers for that topic.**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Offer</th>
<th>Elicit</th>
<th>Answer</th>
<th>Ack.</th>
<th>Tot acts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Road name</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>70</td>
<td>28</td>
<td>39</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>38</td>
<td>52</td>
<td>73</td>
<td></td>
<td>158</td>
</tr>
<tr>
<td></td>
<td>71</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House name / number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>57</td>
<td>22</td>
<td>45</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>18</td>
<td>37</td>
<td></td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postal district</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>41</td>
<td>42</td>
<td>62</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>41</td>
<td>60</td>
<td></td>
<td>152</td>
</tr>
<tr>
<td></td>
<td>68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side-turning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>36</td>
<td>39</td>
<td>66</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>59</td>
<td>34</td>
<td>58</td>
<td></td>
<td>129</td>
</tr>
<tr>
<td>Totals</td>
<td>127</td>
<td>131</td>
<td>129</td>
<td>145</td>
<td>532</td>
</tr>
</tbody>
</table>

The $\chi^2$ value for this table is 23.8, $p<0.01$. This indicates that the categories are not independent. The road name was offered more than would be expected, whereas the district and nearest side turning were elicited oftener than offered. The road name was acknowledged more often than other pieces of information. There are therefore different patterns of information transfer for different topics.

Figures 1, 2, 3 and 4 show the frequency with which transfer acts occurred at each turn during conversation. The Y axes of these graphs have been kept constant for comparison, but the X axes have not.
Figure 1  First turn in which information was offered for each topic.

Figure 2  First turn in which information was elicited for each topic.
Figure 3  First turn in which information was answered for each topic.

![Graph showing frequency of information answered for each topic]

- Road name
- House name
- Postal district
- Side turning

Figure 4  First turn in which information was acknowledged for each topic.

![Graph showing frequency of information acknowledged for each topic]

- Road name
- House name
- Postal district
- Side turning

For each topic offers start at a high level and tail off as time goes on. This is most pronounced for road name. Most offers have ceased by about the 10th turn. The picture is rather different for elicitation. Questions start slightly later. Road name and house name peak early and tail off. Postal district and side turning lag slightly behind these and tail off much later. In the case of questions the tail off occurs after about 20 turns. Answers lag behind questions but in the same form.
Road name and postal district are the only topics with pronounced peaks in acknowledgement. Instead these seem to carry on through the call at a fairly steady rate and for longer than the other transfer acts. There is a low rate of acknowledgement for house name early in the call where this topic has a high rate of offers.

**Lapses before completion of transfer**

The number of turns which lapsed between the pair-parts of information transfers were counted, that is, the number of turns between an offer being acknowledged, between a question and its answer and between an answer being given and being acknowledged. As each part of the transfer is initiated by one interactant and completed by the second all turn lapses are uneven numbers. Only transfers which were completed are included here.

**Table 2** Number of turns lapsed between pair-parts of information transfers.

<table>
<thead>
<tr>
<th>No. Turns</th>
<th>O-Ack</th>
<th>E-Ans</th>
<th>O-Ack</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>18</td>
<td>29</td>
<td>86</td>
<td>72</td>
</tr>
<tr>
<td>3/5</td>
<td>20</td>
<td>32</td>
<td>31</td>
<td>26</td>
</tr>
<tr>
<td>7+</td>
<td>24</td>
<td>39</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>100</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

$\chi^2 = 49.82$, df=10, p<0.01.

The shortest lapses were between Elicit and Answer. The longest lapses occurred between Offer and Acknowledge. The lapses between pairs were then considered separately. Because of small cell frequencies the lapses were collapsed into immediate response, that is, one turn lapsed, and longer gaps, three turns and above.
Table 3  Turn lapses in Offer to Acknowledge by topic.

<table>
<thead>
<tr>
<th>Turns</th>
<th>Road</th>
<th>House</th>
<th>District</th>
<th>Side turn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>24</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3+</td>
<td>26</td>
<td>76</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

χ² not calculated because more than 20% of expected cell frequencies are less than 5.

Table 4  Turn lapses in Elicit to Answer by topic.

<table>
<thead>
<tr>
<th>Turns</th>
<th>Road</th>
<th>House</th>
<th>District</th>
<th>Side turn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>71</td>
<td>18</td>
<td>95</td>
</tr>
<tr>
<td>3+</td>
<td>8</td>
<td>29</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

χ²=8.14, df=3, p<0.05

Table 5  Turn lapses in Answer to Acknowledge by topic.

<table>
<thead>
<tr>
<th>Turns</th>
<th>Road</th>
<th>House</th>
<th>District</th>
<th>Side-turn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>36</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>3+</td>
<td>14</td>
<td>64</td>
<td>8</td>
<td>62</td>
</tr>
</tbody>
</table>

χ²=8.47, df=3, p<0.05

129
Although elicit-answer lapses are shortest they vary across topics. House name is almost always answered immediately, while 41% of postal district questions led to some sort of side sequence, that is, intervening speech, before being answered. Answers to postal district questions are acknowledged immediately in 74% of cases whereas road and house name answers tend to be acknowledged only after a lapse.

Some trends can be noticed in these tables. The operator is less likely to acknowledge the road name immediately than any other information, whether it is offered or elicited. Operators' elicitations of the postal district are the least likely to be answered immediately, but once answered this information is generally acknowledged quickly.
Table 6  Checking and abandoning by topic, frequency and as a percentage of calls where that topic was covered.

<table>
<thead>
<tr>
<th></th>
<th>Major Check</th>
<th>Minor Check</th>
<th>Abandon</th>
<th>Topic Mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Road</td>
<td>2</td>
<td>3</td>
<td>49</td>
<td>69</td>
</tr>
<tr>
<td>House</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td>Postal district</td>
<td>3</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Side turning</td>
<td>3</td>
<td>5</td>
<td>20</td>
<td>34</td>
</tr>
</tbody>
</table>

Half of these cells had an expected cell frequency less than 5. Therefore a $x^2$ was not computed.

Abandoning a topic is a very rare event. In seventy-two calls this occurred only three times, in three separate calls. Major checks of the information given is more common with checks made on all but the house name or number. As this information would not appear on a map the operator has no way of knowing whether is is correct or not. Major check would not therefore be possible. Minor checking is quite common, a great deal being accounted for by spelling and checks on the pronunciation of words. Checks of the road name are by far the most common, occurring in 69% of the cases where this information was given.

Communication errors
Four measures of communication breakdown were used. These were
a) information is offered but not acknowledged (O/ACK)

b) information is offered and subsequently elicited by the operator (O/E)

c) information is asked for and not given (E/ANS)

d) information is given in answer to a question and not acknowledged (ANS/ACK)

For each error a call scored 1 or 0 for each topic.
Table 7  Frequency of each type of breakdown by topic as absolute frequency and as a percentage of the number of first parts of that pair.

<table>
<thead>
<tr>
<th></th>
<th>O/ACK</th>
<th>O/E</th>
<th>E/ANS</th>
<th>ANS/ACK</th>
<th>Tot errors/ Mentions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>14 28</td>
<td>6 12</td>
<td>0 0</td>
<td>7 13</td>
<td>.38</td>
</tr>
<tr>
<td>House</td>
<td>20 71</td>
<td>7 25</td>
<td>1 5</td>
<td>14 48</td>
<td>.82</td>
</tr>
<tr>
<td>Postal district</td>
<td>12 43</td>
<td>4 14</td>
<td>3 7</td>
<td>14 34</td>
<td>.49</td>
</tr>
<tr>
<td>Side turning</td>
<td>8 38</td>
<td>2 10</td>
<td>5 13</td>
<td>12 34</td>
<td>.40</td>
</tr>
<tr>
<td>Totals</td>
<td>54 43</td>
<td>19 15</td>
<td>9 7</td>
<td>45 35</td>
<td></td>
</tr>
</tbody>
</table>

An answer to a question is more likely to be given than acknowledgement to either volunteered or elicited information. Consistently over the four topics elicited information is more likely to be acknowledged than volunteered information. There is considerable variability across topics. Whereas all questions about the road name were answered, 13% of those about the nearest side turning were not. Seventy one percent of offers of the house name or number led to no acknowledgement of the information and in 25% of these cases the operator went on to ask for the information as if it were not known to her.

DISCUSSION

It is apparent that different topics are treated differently by both operator and caller. Callers tend to volunteer certain types of information such as road name more readily than others such as side turning. The operator therefore elicits the postal district and side turning more often than the road or house name. Questions about these topics tend to appear later in the call. The bulk of the callers' offering of information comes in the first few turns of the call, suggesting that the caller will initially volunteer whatever information they have which they feel is relevant.

Of the four errors considered O/E and E/ANS are the most inefficient in a conversation of this type. E/ANS is probably the most serious case of breakdown because its occurrence means that information required is not forthcoming. This error occurs infrequently and in fact questions tend to be answered in the next turn. Elicit-Answer is a well recognised first pair part,
second pair part sequence in Sacks, Schegloff and Jefferson's (1974) terms. The production of the first pair part obliges the listener to produce the second. This explains the speed with which questions are answered, however, there may be cases where the second party is simply unable to complete the sequence, that is they do not know the answer. Their second pair part will then consist of a disclaimer "I don't know" which completes the transaction but which does not make the required information available. This is therefore acceptable in conversational analysis, but a failure in information exchange and in the current task.

O/E is inefficient in that ground must be covered twice. The other two errors, O/ACK and ANS/ACK would seem to be less serious in that an operator can have assimilated information without acknowledging the fact. It is worth noting, however, that the highest relative incidence of both O/ACK and O/E occur with the same topic, house name or number. This suggests that in these cases at least the lack of acknowledgement on the part of the operator was indicative of a lack of receipt of the information given by the caller.

Although the road name is subject to a great deal of what has been termed minor checking it is the nearest side-turning, the need for which the caller is least likely to anticipate, that leads to high levels of major checks, relatively high levels of minor checks and to being abandoned. The evidence of difficulty in dealing with the topic therefore supports the supposition that this information falls outside the caller's 'script' and presents the greatest problems for task efficiency.

While many of these findings may seem obvious what they point to is that the structuring and management of a conversation may depend on the type of information being dealt with. The information looked at here covers a very limited range. It all concerns the address of the incident to be attended. But even within this range there is variation in how that information is transferred, on the time taken to do so and on the likelihood of breakdown during the transfer. With a wider range of information these findings would
be expected to be more pronounced, with different parties taking responsibility for different aspects of the call.

It was shown in Chapter 7 that the two parties in these calls tend to use different types of speech act, with the caller using Offer and the operator using Elicit and Acknowledge. It now appears that they may use these speech acts to deal appropriately with different topics. The caller uses Offer for topics s/he already knows to be relevant, while the operator is more likely to Elicit information which may seem less pertinent to the caller. Therefore the choice of speech act, which in turn leads to a speech act repertoire for each party, seems to be task specific.
CHAPTER 10  FACETS OF CONVERSATIONAL MANAGEMENT: RELATIONSHIPS BETWEEN ASPECTS

INTRODUCTION
In previous chapters a number of aspects of conversational management have been considered: interruption, speech acts, information transfer and so on. Each has been studied in isolation. In this chapter an attempt will be made to study the interrelationships between some of these types of conversational behaviours.

Resource theory suggests that each of these conversational events is neutral, until it is used toward a given end. That is these behaviours are not in themselves dominant or supportive but may be used for dominance or support in a given conversational context. Because these events are neutral conversationalists may choose consciously or un-consciously from a repertoire of such events to suit their purpose and situation at any time. This suggests that conversational events or behaviours should be distinguishable more on the basis of their context than on their degree of dominance.

The implication of this theory is to reduce the status of control or dominance as important ways of describing conversations. If for example interruptions are seen as a dominant behaviour, then conversations with a number of interruptions will be seen as evidence of the speakers' will to manifest their dominance in the interaction. If, on the other hand, interruptions are basically neutral then their use may be due to a wish for dominance or a response to some other aspect of the conversation such as excitement. This latter would be the case in the Edelsky example of collaboratively developed floors.

The context of a behaviour can be defined in a number of ways and at a number of levels. At the micro level the context can be taken as the immediately preceding behaviours. At the macro level the context can refer to the conversational setting. Here context will be taken as closely bound to the task of the conversations. This is because of the overriding importance of
Chapter 10

the central task of summoning the fire brigade to these emergency calls. The question is therefore whether conversational events can be distinguished on the basis of control or on the basis of the conversational task. Resource theory would predict that the task would override dominance.

The aim of this study is to build a conceptual model of the functional relationships between variables from different domains. In order to facilitate this task there is a need for a theoretical approach which provides a framework for both analysis and the interpretation of results. This framework should provide a formal system for representing sets of interrelated, multivariate hypotheses, that is, combined with empirical procedures for examining their validity. Such a framework can be provided by facet theory (Gratch, 1973). Facet theory provides a formal procedure for classifying and categorising the variables in a study. A facet can be thought of as a way of categorising variables, so that each variable must belong to one and only one category. Therefore sex could be a facet with two elements, male and female. Beyond the simple classification of variables, facet theory provides a rationale for hypothesising the correspondence between this categorisation and empirical observations. Furthermore, as variables can contain elements of more than one facet, that is, can be classified simultaneously in several different ways, relationships between facets can be hypothesised.

While facet theory was developed as a framework for the complete process of designing, analysing and interpreting studies, it is particularly useful as a method of analysis for exploratory studies (Canter, 1985). The object of interpreting results is to see whether the predicted facet structure can be retrieved from the data. In other words, if the sex facet is hypothesised to be important in a study then it should be possible to demonstrate this classification empirically. Using an MDS technique which represents data spatially on the basis of similarity, facets can be derived in the form of distinct regions of the space containing variables from each element of the facet.
Three facets are of interest here, the first dealing with control or dominance, the second with the task of the call and the third being the role of the speaker, operator or caller. Resource theory would predict that the control or dominance facet would be secondary to the task facet and in particular that the level of control attached to any behaviour will be dependant on its use in context. Therefore, there should be varying levels of control within each element of the task facet. If operators control the conversations then the role facet should be strongly linked to the control facet. This study will therefore attempt to partition a multidimensional representation of conversational behaviours according to these three facets.

METHOD
A sample of 89 calls were coded on 21 variables. All of the variables had been considered in previous studies. The variables and their coding is given in table 1. Variables to do with information transfer had to be excluded from this analysis because their occurrence depended on a particular item of information becoming relevant in each call. Each variable was coded to give, as far as possible, an equal distribution of 1 and 2 scores. In practice this means that variables with a low overall frequency of occurrence were coded on the basis of occurrence or nonoccurrence while more frequently occurring variables were coded above and below the mean.
Table 1  Coding of variables.

<table>
<thead>
<tr>
<th>Type</th>
<th>Variable</th>
<th>Coding</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction space</td>
<td>1 No. words spoken by the operator as a % of total words spoken</td>
<td>0-44%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45-55%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>55%+</td>
<td>3</td>
</tr>
<tr>
<td>Assent words</td>
<td>2 No. of assent words spoken by the operator as a % of operator's total words</td>
<td>0-9.81% (mean)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.82%+</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3 No. of assent words spoken by the caller as a % of caller's total words</td>
<td>0-5.22% (mean)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.23%+</td>
<td>2</td>
</tr>
<tr>
<td>Interruptions</td>
<td>4 Successful interruption by the operator</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5 Unsuccessful interruptions by the operator</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>6 Successful interruptions by the caller</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>7 Unsuccessful interruption by the caller</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td>Speech acts (as % of total speech act usage)</td>
<td>8 Operator - Open</td>
<td>0-7.99%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.00%+</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>9 Operator - Offer</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>10 Operator - Requests</td>
<td>0-24.84%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24.85%+</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>11 Operator - Q</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>12 Operator - QU</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>13 Operator - Acknowledge</td>
<td>0-33.71%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33.72%+</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>14 Operator - Close</td>
<td>0-17.03%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.04%+</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>15 Caller - Open</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>16 Caller - Offer</td>
<td>0-30.84%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30.85%+</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>17 Caller - Reply</td>
<td>0-27.93%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27.94%+</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>18 Caller - QU</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>19 Caller - Acknowledge</td>
<td>0-16.27%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.28%+</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>20 Caller - Modify</td>
<td>Nonoccurrence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occurrence</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>21 Caller - Close</td>
<td>0-8.94%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.95%+</td>
<td>2</td>
</tr>
</tbody>
</table>
These data were analysed using SSA-I for ordinal data (Guttman 1968). The SSA program computes correlation coefficients between all variables, then rank orders these correlations, in this case transforming an original rectangular data matrix into a triangular matrix consisting of coefficients of similarity for each variable against each other variable. It is these coefficients that are used to form a spatial representation of items with points representing variables and the rank order of the distances between points being inversely related to the rank order of the correlations. Iterations are performed comparing the rank order assigned to the correlations with the rank order of the distance while adjustments are made to the geometric representation. The closer the two rank orders the better the 'fit' between the geometric representation and the original correlation matrix, that is, the lower the 'stress'. The iterations continue until the minimal 'stress' possible is achieved, within the predesignated number of dimensions and iterations.

A measure of stress called the coefficient of alienation is used within the computing algorithm as the criterion in bringing the iterative procedure to an end. It can therefore be used as a general indication of the degree to which the variables' inter-correlations are represented by their corresponding spatial distances. The smaller the coefficient of alienation, the better the fit of the plot to the original correlation matrix.

In the final configuration the more highly correlated (the more likely to co-occur) two variables are, the closer they will appear as points in the dimensional space. Since the configuration is developed in respect to the relationships among variables and not from their relationship to some given dimension or axis, the orientation in space of the axes of the resulting geometric representation are arbitrary. Therefore, the pattern of points (regions) can be examined directly without the need to assume underlying orthogonal dimension.

Overall classification of the types of variables that group together provides an account of the major underlying differences amongst these variables, i.e. empirically supported facets. The SSA representation therefore offers a basis
for developing hypotheses about the grouping of variables. A grouping of variables, forming an element of a facet, provides a basis for classifying behaviours on the basis of their usage in calls.

The postulation of facets goes beyond the rather arbitrary proposals of grouping, by using the principle of contiguity (Foà 1958, Guttman 1965 and Shye 1978), which states that because elements of a facet will be functionally related their existence will be reflected in a corresponding empirical structure. In other words, variables that share the same facet elements will be more highly correlated and thus should appear closer together in the multidimensional space than variables not sharing the same element.

This idea of contiguity can be extended as a general regional hypothesis. Items that have facet elements in common will be found in the same region of space. Likewise, variables which have low inter-correlations will appear in different regions of the plot, indicating dissimilarity, and no membership of the same facet element. Contiguous regionality in a multi-dimensional space is a quite specific identification of a facet element, providing a clear statement can be made of what the variables in that region have in common. Of course, once the exploratory phase of hypothesis generation has led to the establishment of facets the existence of contiguous regions can be used as a strong, precise test of the hypothesised facets.

The approach taken to interpretation of the SSA, then, is to see whether the plots, shown in figures 1 to 3, have any interpretable regional structures. The null hypothesis is that the variation in behaviours is so diffuse that no coherent interpretation of the SSA plots is possible.

RESULTS
A 3 dimensional solution had a coefficient of alienation of 0.2 after 29 iterations. This coefficient is a measure of goodness of fit. Normally a value below 0.15 is used (Guttman, 1968). For exploratory data, however, a value of 0.2 is acceptable. The output of the SSA-I is given in figs 1, 2 and 3 below.
The first space (vector 1 by vector 2) can be divided by the function of the variables within the call. Central to the space are the turn management or interruption variables. This suggests that these variables have equal importance to all aspects of the call. The outer part of the space is divided into three sections. The first consists of those variables used in defining the boundaries of the problem; caller Offers - the caller's statement of the problem and the relevant information that s/he wishes to pass on, the operator's use of assent terms which may be to support the caller's exposition, operator Open - an indication that the caller is through to the appropriate service, Closing by the operator or caller indicating that the task (of summoning the fire brigade) has now been dealt with.

The second section has been labelled feedback to caller. The variables included here are caller open, operator offer, operator acknowledge. As the caller is passed from the British Telecom operator to the Fire Brigade operator the caller's opening is to get feedback about which operator they are talking to and whether the emergency call proper has now started. Unless the incident has already been reported the operator cannot offer information about the incident as only the caller has this information. Therefore the operator's information tends to be about the process of the call and fire brigade procedures. This feedback can be positive or negative, in the sense that the operator may tell the caller about procedures because of a perceived failure on the caller's part. Operator acknowledgements indicate that the caller's information is being received and accepted.

The final section has been labelled interrogation. All the variables in this section revolve around regulating the information flow between operator and caller. Unlike Offer these variables are inquisitorial in nature.

The arrangement of these groups in space suggest a Radex structure, which is essentially circular. In a Radex structure the space is partitioned rather like cake slices. It can be seen from the projection of vectors 2 and 3, however, that the space is partitioned in slices. The structure is in fact a distorted ordered linear partitioning of the space. This distortion is brought about
because the turn management variables are common to all levels. This distinction between a circular and a linear partitioning of the space is important to interpretation, as a linear structure suggests order while a circular structure does not.

Figure 1    SSA-I vector 1 by vector 2.
The second space, which represents vector 2 by vector 3, can be partitioned in ordered slices. These move from those variables which are more directly interventionist (successful interruptions, offers and questions) through interjection and responses and on to conventionalised utterances, opening and closing. Replies by the caller appear in the less interventionist / more reactive area of the space, along with an uneven distribution of speech in favour of the operator.
This analysis suggests that the variables can be viewed in two ways. First according to their function in structuring the call and second by the extent to which the variable is interventionist or reactive.

There is no split between the equivalent variables for operator and caller, where they exist. In dimensions 3 by 1 equivalent behaviours tend to be grouped across role. This suggests that these behaviours are equally interventionist whether performed by the operator or caller. Therefore, if these behaviours are used to control or influence the conversation they can
be used in that way by both parties. What is interesting is that these behaviours tend to have a different function depending on the role of the executor. Thus, caller's Offers are expositional, being in the boundaries region with operator Open and caller Open and Close, whereas operator's Offers are in the feedback region with operator Acknowledge and caller Open. Operators Acknowledgements function as feedback, whereas the caller's are part of information processing.

**DISCUSSION**

The purpose of the SSA analysis was to examine the structure of conversational behaviour within an emergency call rather than the simple relationships between one or more behaviours. From this structural analysis two independent underlying facets, can be identified. The first is the function facet, which orders behaviours according to their function in the call, this function being a by-product of the task of the conversation. This suggests that the conversations can be viewed as having three components: boundaries, feedback and interrogation. Of these three components, interrogation would seem to be the most relevant or central to the task, this constituting the essence of a 999 call. The other sections are necessary to the smooth completion of the task, but each in turn sets the stage for the activity of most importance. The link between this order and time is not, however, simple. These is no suggestion that the stages must be reached in this order within the call. The boundaries are of course likely to be positioned at the beginning and at the end of the call. An interaction could, however, proceed directly from boundaries to interrogation.

In the SSA projection where the function facet can be seen most readily the simple ordered nature of the facet is distorted by the grouping of the turn management variables. The placement of this group of variables suggests that they act at all levels of the call, i.e. they play a part at each level of the facet.

The second facet, degree of intervention, is also ordered, in this case from reactive or conventionalised utterances to assertive measures such as
Interruption and Offers. Although this facet can be viewed for simplicity as having two categories it does suggest that interventionism varies along a continuum. Although this facet has been labelled interventionism, it is closely related to ideas of control or dominance. Those variables with most controlling force such as Offers and Requests are in the more interventionist region. This suggests that conversational behaviours can be distinguished on the basis of dominance / control.

The role facet was not supported. Had this facet been supported this would have been evidence that the operators and callers had styles so distinct that each person's usage of conversational behaviours depended more on their role than on the interaction with their partner. While it has been shown, particularly in the case of speech acts, that there are role differences, the absence of support for this facet suggests that the interaction between operator and caller is stronger than the role differences in style.

The assumption make from the application of the resource model to the facet analysis of these conversational behaviours was that the degree of control associated with a behaviour would be dependant on that behaviour's function in the task. Partial evidence for this prediction does emerge from the analysis. While the existence of a role facet was not supported by the analysis it does appear that similar behaviours by the operator and caller have different functions. The intervention facet, however, orders behaviours so that these behaviours fall in within one element of the facet, that is, at the same level of interventionism, regardless of the role of the speaker.

This is not to say, however, that these behaviours would be similarly interventionist or reactive in a different context.

In chapter 6 the assumption make by Leet-Pellegrini (1980) that assent words were supportive was questioned. It was suggested that assent words could have two functions, one as an acknowledgement of speech and a second to signal topic change (Jefferson, 1972). Looking at the task facet we find both caller's 'Assent words' and 'Acknowledgements' in the interrogation
element, while the operator's 'Assent words' is in the boundaries element and 'Acknowledgements' is in the feedback element. If the boundaries element is taken to include the caller's initial exposition of the problem, then the operator's use of assent words being also part of this element does suggest that they may be used to signal to the caller that this information has been received and a topic change should take place. As operator Acknowledge can include other possible types of acknowledgement, such as repeating part of the caller's utterance, it may be that the operator uses these more specific types of acknowledgement for actual feedback on information.
CHAPTER 11 DISCUSSION

SUMMARY
This study set out to examine aspects of conversational management in emergency (999) calls to the fire brigade. This examination was undertaken with three aims; to study conversation management in natural interactions which were overwhelmingly task-oriented, to establish links between different aspects of conversation management and finally to see whether conversation management had implications for the efficiency of the interaction.

These calls are particularly appropriate for the study of conversation management because of the fact that they are emergency telephone calls. The participants share a common self-defined goal. They are also strangers who are unlikely to meet at any time. The completion of the task at hand is, therefore, the only motivation for participating in the conversation. Furthermore the task, bringing about the attendance of the fire brigade at an incident, is important to both participants. Finally, the conversations took place over a sound-only channel, a constraint which tends to lead to conversations being more task-oriented (see chapter 3). This concentration on the task makes these calls quite unusual as a sample of verbal interaction. The first aim of the study was, therefore, to examine how conversations were managed in these highly task-oriented conversations.

The task itself also places constraints on the conversation. The most important of these is urgency. Time is a critical factor in the development of fires and the time taken for the operator to find out the address of an incident makes up part of the overall attendance time of the fire brigade. As time may have already been lost before the call is made (see chapter 1) it is important that further time is not wasted during the call itself. The urgency of the situation therefore imposes a very real time constraint on these interactions. In these calls, then, the reduction of the length of the call is always the foremost measure of efficiency.
This same urgency, the potential seriousness of a fire and the fact that making a 999 call is an unusual event can be stressful for the caller. In this sample both the seriousness of the incident and the involvement of the caller varied a great deal. Some calls were reports of small fires by passing motorists, some were made by people who's home was on fire. The level of stress experienced by callers may, therefore, have varied a good deal. However, stress or the potential for stress is always present in these calls.

A third feature of these calls which should be noted is that one speaker, the operator, is an 'expert'. The operator knows what is required from the interaction and is the person who is responsible for ensuring that help arrives at the incident. The operator is also an expert in the sense that he or she deals with 999 calls as an every day job and is, therefore, very experienced in this situation.

The caller, on the other hand, is usually a naive user of the system. As was shown by Eardley (1983), few people know how to make a 999 call in detail. However, the non-expert in these calls is the person who has all the necessary information. Thus the operator knows the type of information required, but not the actual information, while the caller is in the reverse position of knowing the information but not necessarily which particular pieces are relevant. The interaction revolves around the transfer of this information from naive informant to uninformed expert.

Emergency calls are therefore task-oriented conversations where the task is quite unusual. This makes it possible to take the task itself into account in the examination of the effects of task orientation on the interaction.

Beyond being task-oriented there is also the lack of social influences. This is largely because the interactions are short and the interactants are strangers. There is very little possibility that the interactants will meet or even speak to each other again; the operator is never identified by name. There is, therefore, little motivation for the establishment of a social relationship.
As these interactions are so task-oriented and non-social they provide a good test case for establishing links between the different aspects of control outlined in chapter 2. This study concentrated on three aspects of conversation management, turn, speech act and information management. It has also been pointed out that in most conversations a fourth aspect, social management, would be relevant. Although these three aspects are often studied separately, there is no reason to suppose that they are unrelated. In fact, conversationalists must deal with all aspects simultaneously. Taking just two of these aspects it has been shown that their manifestation in these calls was indeed related not to which aspect of management they represented. The distinctions which emerged were function, relating to the task of the interaction, and level of interventionism (or control).

The third aim was related to the more practical issue of how the efficiency of 999 calls might be increased. Because of the nature of fires, with their tendency to escalate rapidly, the fire brigade devotes considerable time and resources to reducing attendance time by seconds. Indeed the design of the 999 control room and the computerised system now used by the London Metropolitan fire brigade was studied to increase the time efficiency of calls (Husain, 1981). It seemed worthwhile, therefore, to examine the human factor as a starting point to at least see how very long calls might be dealt with differently. There would be little use in having very efficient information management systems if the interaction required to obtain the information were inefficient.

As the calls are naturally occurring they pose certain problems in analysis. Unlike the conversations studied by Thomas, Bull and Roger (1982), for example, these conversations are not of a set length, nor do they follow a consistent agenda. Some of the calls were not even completed. The conversational style of either of the speakers could not be manipulated, nor could pairs of speakers be chosen in advance, as was done, for example, by Mulac (1989). However, the fact that the calls were real life events adds substantially to their value for study. These calls had real importance to the interactants, they were involved in the conversations through their own
choice. Furthermore, the purpose of the calls was external to the conversations, the interactions were intended to have an effect in the outside world. As has been pointed out by Beattie and Barnard (1979), in the context of the study of speaker switching, "Natural telephone conversations have specific functions and practical constraints of time and cost and are likely to motivate partners to communicate as smoothly as possible...“ (p216). In these conversations these practical constraints may be expected to assume even more importance. Therefore, whatever conversational strategies or skills the interactants brought to bear were being used not for their own sake, but for a real purpose. This use of conversation to achieve a real goal, not one set by an experimenter, should provide insight into the natural, unselfconscious use of conversation management skills. It should help us to see how conversation operates to help people communicate in way that will enable them both to achieve specific goals, a primary function of conversation.

Several studies have looked at the effects on conversation of removing visual cues. These have shown that no-vision conversations tend to be characterised by having fewer interruptions (Beattie and Barnard, 1979; Rutter and Stephenson, 1977), more utterances ending in a question (Rutter, Stephenson and Dewey, 1981), more question and answer sequences (Rutter, 1984) than face-to-face interaction and by being generally more task-oriented and depersonalised than face-to-face interaction (Stephenson, Ayling and Rutter, 1976; Rutter, 1984). However, of the four reasons given at the beginning of this chapter for describing emergency calls as highly task-oriented (there is sound-only communication, the participants are strangers, they share a common goal and the goal is real and of immediate importance) only the Beattie and Barnard (1979) study of directory enquiry calls displays three of these characteristics. None display the fourth, that the goal has intrinsic importance.

Although 999 calls are not the most extreme example possible of task-related calls, they do provide the opportunity to see whether findings from less task-oriented conversations hold true in a situation where a number of factors,
rather than just the lack of visual cues, conspire to concentrate the participants on the completion of their task.

In most instances the findings from earlier studies hold for the current sample. There was a good deal of role differentiation in the use of speech acts and in the handling of information, as was also found by Rutter (1984) with telephone tutorials. Questions and question-answer sequences were prevalent with requests making up 14.6% of the speech acts in the corpus and 26% of those used by the operator. Reply, the most likely act to occur after a request, made up 13% of all acts and 28% of those used by the caller. These findings confirm those of Rutter et al. (1981) and Rutter (1984).

There was, however, one important difference from previous findings. The Beattie and Barnard (1978) study was concerned with whether it was possible for interactants to achieve smooth turn switches in the absence of visual turn-yielding cues. They therefore compared, among other measures, the percentage of speaker switches which involved simultaneous speech in two sets of interactions: directory enquiry calls and dyadic university tutorials. They found that 10.6% of switches involved simultaneous speech in the face-to-face situation but only 6.3% of switches in the telephone interactions. This finding agrees in direction with Rutter and Stephenson (1977) and Rutter (1984), although these studies reported the incidence of interruption in a fixed time period rather than rate of interruption. In the 999 calls, however, the equivalent percentage was 10% of speaker switches, so that the interruption rate was closer to the face-to-face rate reported in Beattie and Barnard than to the telephone rate.

Therefore, although these calls showed many of the aspects of task-oriented, no-vision conversations which would have been predicted from previous studies, it would appear that in one respect at least the behaviour of interactants did not conform to expectations. The higher than expected rate of interruption may be a consequence of the urgency of the calls. Since no difference was found in the overall rate of interruption in two types of 999
call where the incident differed in degree of urgency (see chapter 6), this must be considered a speculative explanation until further work can be carried out.

Previous studies of conversational management have emphasised the dominance of aspects of speech style, in particular interruptions (Beattie, 1981a; Ferguson, 1977; Zimmerman and West, 1975). The present study rather emphasises control. While dominance is one aspect of control, control is a less judgemental term and furthermore covers aspects of management which are not obviously dominant. For example, interruptions may be generally perceived as dominant where one person prevents a second from completing what s/he is saying. In contrast, asking a question may not be perceived as dominant even though this action will lead almost inevitably to an answer. Therefore the first speaker has exerted control over the action of the second speaker without a display of dominance. Control also seems to be a more appropriate term when there is no evidence that the participants would wish to establish a power relationship.

Aspects of control were examined at each of the three levels: turn management, speech acts and topic management. A short summary of the findings at each level is given below.

In addition, behaviours considered separately under two of these headings, turn and speech act management, were examined together, using a multi-dimensional scaling technique, and it was shown that they could be classified using two facets. The first facet related to the task of the conversation and had three elements: boundaries, feedback and interrogation. The second facet ordered behaviours according to their degree of interventionism, from reactive to proactive.

Finally it was shown that control is linked to the task of the conversation in so far as different aspects of control are relevant to the different functions which go together to make up the call. For example, the operators' use of Requests seem to act as a control mechanism in the interrogation function, while the operators' use of assent terms may be used to signal topic change,
and is therefore part of the boundaries function. This linking of two aspects of conversation management will be discussed in more detail later in this chapter.

As time is critical in these calls, one of the central tasks of conversation management must be to reduce time wastage. The calls are generally short which shows that this task is normally accomplished successfully. As a background to the detailed study of conversational management chapter 4 looked at what happened in 16 longer calls. An examination of these calls gives an insight into the sorts of problems interactants may be dealing with in carrying out the conversation. Two types of problem were identified in longer calls. The first type was associated with increasing length of time taken to complete the call. These problems seemed to be related to anxiety in the caller. The second type of problems were to do with the information transmitted in the call. Altogether, the incidence of problems in these longer calls was high. Given so many problems in a small number of calls the range of difficulties which could be encountered may be quite high. The majority of calls are not, however, plagued with problems. This suggests that the interactants have ways of dealing with an often noisy communication channel, the absence of vision, anxiety on the part of the caller, the inexperience of the caller, the lack of detailed information and so on. Two methods of dealing with these problems became evident in the subsequent chapters. First the receipt of information is made explicit by the use of verbal acknowledgements. Second, there is a good deal of checking and repetition.

In chapter 6 aspects of turn management were examined. The expectation was that operators, being the experts in these calls, would be more controlling and less supportive than callers and that men would be more controlling than women. Furthermore, an interaction between role and sex was expected so that male operators would display most control and female callers the least. It was found that, in fact, there were no simple role or sex differences in the number of interruptions used. However, while operator's sex did not affect the use of interruption, when the caller was a woman both parties used more interruptions. This suggests that operators' use of interruptions is
determined by their role, rather than their sex, while the callers act as would be predicted for their sex. Operators, therefore, appear to adopt a style of speech. At present it is a matter of speculation as to how operators develop this style.

There was no difference in the amount spoken by men or women, but there was an interaction between the sex of operator and caller, with mixed-sex dyads speaking more than single-sex dyads. Leet-Pellegrini (1980) found a simple sex effect, with male experts speaking more than their partners relative to female experts. For male experts the mean difference between the amount of male and female speech was 0.76, for female experts the mean difference was 0.65, with speech measured in lines of transcript. Mulac (1989) found that, in mixed-sex dyads men spoke more than women, with men speaking for a mean of 31.43 seconds and women for a mean of 26.47 seconds. Furthermore, this finding held true whether the man or the woman in the dyad was higher in perceived power. In the present study male and female operators each spoke 60.6 words on average in mixed sex calls, with male callers spoke 65.4 words and female callers 69 words. Therefore male and female operators were spoke equal amounts and for callers it was women who tended to speak more.

A second measure of control, the use of assent terms, was also examined. The use of assent terms should signal supportiveness, the opposite of control. Contrary to predictions, again drawn from Leet-Pellegrini (1980), operators used many more assent terms than did callers. Leet-Pellegrini found that non-experts assented more than experts, except where a female expert was paired with a male non-expert, with mean difference between expert / non-expert pairs in their use of assent terms being as follows: M/F, -2.35, M/M, -1.45, F/F, -0.4 and F/M, 2.85 (Leet-Pellegrini, 1980, p102). In the present study it was found that 9.9% of operators’s words were assents words against only 5.86% of the callers’.

These results all run contrary to expectations. In particular, operators do not seem to be controlling the conversation by speaking more or interrupting
more than the caller. They also use more assent terms than the caller, a
behaviour expected to be linked to lack of control. The use of assent terms
turns out to be an important part of the operator's role in the conversation, as
they use acknowledgements to signal receipt of information. Likewise, men
do not seem to control the interaction. While women callers are interrupted
and attempt to interrupt more than male callers, this is the case with both
male and female operators. Hershey and Werner (1975) and Askinsas (1971)
found that speaking more was not necessarily sex linked, but depended on the
interaction experience of the speakers. This may also be true in the case of
interruptions in the case of 999 calls. It may be the case that female operators,
in a job with a majority of women, have some of the same experiences as
Hershey and Werner's feminist wives, or the groups from mixed sex housing
studied by Askinsas.

The expectation that men and operators should have similarities in style is,
however, based on the premise that certain behaviours are dominant because
they are used more often by men. In this case that premise does not hold.
Evidence for operators' control cannot therefore be found directly at this level
of management.

The next step, in chapter 7, was to look at the use of speech acts by operator
and caller. Based on findings by Thomas, Bull and Roger (1982) it was
expected that speech acts could be used to control the conversation. It was
found that there was a completely different usage of speech acts in these calls
to the experimentally structured conversations studied by Thomas et al.
Furthermore, and not surprisingly, operators and caller used different types of
speech act, with operators eliciting or acknowledging and callers giving
information and using both positive and negative acknowledgement. As
mentioned previously, this differentiation between the operator eliciting
information and the caller giving information may be partly due to the
interaction being conducted over the telephone. Rutter and Robinson (1981),
comparing tutorials held face-to-face and over the telephone, found a pattern
of the tutor seeking contributions from students and students responding by
offering information in the telephone tutorials which is similar to the pattern
found here. In face-to-face interaction, however, the pattern for offering contributions was reversed and there was no difference between tutors and students in elicitation.

It was found that different speech acts led to retention or yielding of the floor. The operators' use of acknowledgement, the assent terms examined in chapter 6, tended to retain the floor but were not a prelude to any specific second act. This act therefore holds the turn in an open manner.

Interestingly, the major states used, that is, those speech acts which may be used as a sequel to a number of acts but which have a smaller number of predictable outcomes, were mainly in the repertoire of the operator. Therefore the operator tends to use acts which lead to a predictable response from the caller whereas the operators' acts are not predictable from the callers' speech. It seem therefore that the operator may control the flow of the conversation by the use of acknowledgements and by channelling the responses of the caller. The most obvious example of this is for the operator to use a Request. This places the onus on the caller to respond with a Reply which the operator may then Acknowledge. The use of Requests in these conversations is important. They make up over a quarter of all the operators' speech acts.

As the operator uses Requests s/he can have control over the introduction of topics by questioning the caller about particular pieces of information. This raises the question of whether the calls revolve around an agenda set by the operator, that is, whether the operator administers a questionnaire to the caller. In order to examine this issue a sequence analysis of the questions asked by the operator was carried out in chapter 8. This showed that while there was some consistency to the beginnings and ends of the calls the central section did not follow a predictable sequence. This suggests that topics are dealt with in an interactive manner.

Chapter 9 presented further evidence that different topics are dealt with in different ways. These differences might be expected given that most callers on
the 999 line are naive and have no idea of fire brigade procedures. Thus the road name is most often offered, and there are few errors in the transmission of this information, while the name of the nearest side-turning is most often elicited and produces more transmission errors. Information which the operator elicits is more likely to receive acknowledgement than that which the caller volunteers. As the operators' failure to acknowledge information happens most often with the topic where the operator is likely to ask for information already volunteered by the caller, it does seem that acknowledgements signal actual receipt of information rather than being non-specific supportive utterances. Checks are made by operators on all pieces of information except that one piece which they cannot independently verify, the house name or number.

It therefore appears that responsibility for information switches between interactants. It is shared between the operator and caller on 'easy' pieces of information such as the road name, where the caller may volunteer and the operator may check or acknowledge information. For more 'difficult' items, such as the nearest side-turning and caller's telephone number, the operator takes responsibility by eliciting and acknowledging information. Thus a different form of management and different speech acts are appropriate for different topics.

In general then the literature is supported by the findings that indicated strong role differentiation in the use of speech acts and the use of assent ters as would have been predicted from Rutter (1984). Also as found by Stiles, Orth, Schelwitz, Henrikus and Valbona (1984), different conversational topics were dealt with using different types of verbal exchanges.

However, several results contradicted previously published findings and many of these discrepancies appear to emerge from the influence of the task on the interaction. Neither men nor operators displayed a dominant turn management style as would have been predicted from Leet-Pellegrini (1980). While interruptions showed a sex difference for callers there was none for operators. This may be due to operators having developed a speech style
through daily experience. The rate of interruptions was higher than would be expected in non-vision conversations (Beattie and Barnard, 1978). This may be because of the time constraints inherent in the interaction.

In the case of speech acts, the repertoire and usage of acts in these calls differed from that found by Thomas, Bull and Roger (1982) in experimentally generated conversation. These differences related to the importance of information transfer in these calls.

One further set of findings neither agrees with nor contradicts previous research. These findings emerge from an exploration of the structure of conversation management using a slightly different approach to past studies. These findings will be discussed in terms of their implications for control and management.

**IMPLICATIONS FOR CONVERSATIONAL CONTROL AND MANAGEMENT**

What becomes apparent is that operator control is evidenced not so much by dominance displays as by dealing with the task in hand. In other words, conversational management is functional. Not only is speech style in these conversations built around the nature of the task, it varies depending on the type of information being dealt with. In chapter 10 this link between speech style and function was explored using multidimensional scaling techniques.

This analysis enabled a framework to be derived that went beyond current work in this field. Concentrating on turn-management and the use of speech acts it was found that these variables could be described using two facets. The first of these related to the task, classifying variables as either relevant to the call boundaries (beginning and end), to feedback and checking or to interrogation, the stage of direct information transfer. This facet was ordered from boundaries through to interrogation, with turn management being relevant to all stages. This ordering relates to the importance of each stage to the task. The second facet related to the degree of intervention represented by the variables and behaviours could be ordered from reactive to
interventionist. The two facets together formed a structure known as a duplex. The interpretation of this structure suggests that the facets are independent, that is, interactants can be proactive or reactive at each stage of the call.

The facet analysis of speech style variables acts as an overview of the analysis in previous sections. The results once again highlight how these conversations are fashioned by the situation in which they occur. The conversational situation is a composite of the purpose of the call, the roles of the participants and the physical constraints imposed by a telephone call. Thus the purpose of the call, the transmission of information about the incident, places emphasis on interrogation. The roles of the speakers also play a part here. The operator knows what is required from the caller by way of an address for the incident and has considerable experience of 999 calls. The caller generally knows the address of the incident, but does not have enough experience of 999 calls to have a fully developed 'script' of what will happen. This role difference again places emphasis on interrogation, as transferring the relevant information becomes an interactive rather than a one-way task.

This multivariate approach therefore provides a method by which the totality of interaction behaviour can be studied, rather than a collection of individual behaviours. This latter approach is that normally taken in analysis of conversational behaviours (see for example Beattie, 1983, Leet-Pellegrini, 1980) although some studies have used other multivariate techniques.

Mulac (1989) used MANOVA to analyse talk behaviour in same and mixed gender dyads. However, although the approach was multivariate, all the variables in question were measures of one type of behaviour, talk. Rutter (1984) used multiple regression to test for relationships between the content, style and outcome of interactions. Here separate analyses were performed with each of three style measure, seven content measure and six outcome measures.
Two previous studies using MDS on different aspects of conversation behaviour show how these techniques can usefully be applied in this area. Wish, D'Andrade and Goodnow (1980) used two separate MDS analyses to establish links between ratings of interaction scenes on bi-polar adjectives and the content of the scenes coded into speech acts. Bell (1986), in a study of the multivariate structure of communication avoidance analysed self-reports of communication behaviour using scaled questionnaire items. The Bell study also used facet theory as a basis for deriving the relationships between the aspects of communication avoidance.

The analysis presented in chapter 10 demonstrates the advantages that this approach has for the analysis of measures of more than one type of interaction behaviour. While the analysis technique itself is useful for studying relationships between a number of variables, it is the conjunction of facet theory with appropriate analysis which has most potential for the study of the structure of interaction across situation and therefore for theory development.

One of the strengths of facet theory is that it provides a conceptual framework for empirical research. The model of conversation proposed here, with the two facets task and degree of intervention, requires further tests by replication in other contexts. The model should hold true for other task-oriented calls where the primary purpose is the transmission of information. Here the task facet would be concerned with the same elements, as the conversation should include interrogation, feedback and boundaries.

In calls with a different purpose, the elements of this facet may not take the same form. The context and purpose of the conversation should, however, emerge as a facet, and again it would be expected that this facet would be ordered from peripheral aspects to central aspects of the conversation. In calls of a more social nature a third facet dealing with affiliation would be expected to have an influence.
An example of how facet theory and its associated analysis methods can be used to provide a framework for cross situation comparison is its application in the field of environmental psychology to provide a model for place evaluation (Donald, 1985). This model proposes that the evaluation of a place, in terms of how well it facilitates a person's objectives in that setting, is based on three facets: focus, referent and level. Here focus distinguishes between overall evaluation and evaluations of specific aspects or items. The referent facet has three elements, social, spatial and services. Level refers to the immediacy of the level of interaction with the setting.

This model was applied across three settings, hospital wards (Kenny and Canter, 1981; Canter and Kenny, 1981), housing (Canter and Rees, 1982) and offices (Donald, 1985). While the overall facet structure remained constant across the three settings the content of the evaluations in each case dealt with the particular environment being studied. Therefore, people evaluate the same aspects of their environment even though the manifestations of those aspect may vary from place to place.

In the same way the two facets which emerge from the analysis of fire alarm calls may be expected to apply in other types of verbal interaction, even though the content of the facet elements may differ.

The first facet, dealing with the content and purpose of the conversation, may relate both the the social and the physical setting of the interaction. Using a telephone line poses several physical constraints on a conversation, such as introducing noise. The lack of visual social cues may make the speakers less spontaneous and more task oriented (Rutter, 1987). This cuelessness increases psychological distance between interactants increasing the likelihood that they will act according to their roles (Rutter, 1987), emphasising the differences discussed above. In these conversations the lack of visual cues may also have a more practical disadvantage. Not only can the operator not see the caller, s/he cannot see where the caller is ringing from. All information about where the caller is, and what the caller can see must be spoken, often over a poor telephone line. This leads to a need for checking,
spelling, repetition and vocal acknowledgement when information is received. In other words, the conversation situation makes feedback important.

It is apparent then that the conversations’ structure, style and management are dependant on the task. Furthermore, they are dependant on parts of the task. Thus, different speech acts are used for dealing with different topics. It may not, therefore, be appropriate to generalise in detail across conversations with different types of purpose. However, purpose should emerge as an underlying descriptor of the interaction’s structure.

The effect of the conversational situation on interaction can be observed in many different ways. The effects of cuelessness, or psychological distance, on conversational style have been mentioned above. Psychological distance can also make assertive communication easier (Furnham, 1986). Therefore the channel of communication can effect interaction. It has also been found that the way messages are delivered is dependant on the intended receiver. Both verbal and non-verbal components of a request may be chosen to suit the level of compliance expected of the hearer (Winterhoff-Spurk, Herrmann and Weindrich, 1986; Grabowski-Gellert and Winterhoff-Spurk, 1988). Likewise, the level of interruptions used may be related, not to the sex of the interrupter, but to that of the person interrupted (Hoffman, 1980). The demands a situation places on a speaker may also affect what they say. Bavelas, Black, Bryson and Mullett (1988) found that politicians equivocate primarily when they find themselves in an avoidance-avoidance situation.

Situational effects may therefore be found on a number of different levels. In fire alarm calls it appears that the primary influence of the situation is the goal of the interaction. This is also true of the studies cited above. In each case it could be argued that the effects found were dependent on how the goal of the interaction related to the dimensions of control and affiliation. Thus, in the study of assertiveness (Furnham, 1986) the goal is high on the dimension of control and becomes easier as psychological distances, and thus the importance of the control dimension, is increased.
The framework afforded by the control and affiliation dimensions would therefore appear to be useful, not only for classifying situations, but also the goals of the participants. Indeed, it is probable that it is the positioning of the interactants' goals which determines the characteristics of the situation.

In some ways operators can be seen to manage the course of these conversations, for example in their use of speech acts. In other ways they do not, for example with interruptions. Further, looking at information transfer shows that this control differs from topic to topic. This apparent lack of consistency becomes less problematic if the ideas of the resource model of turn-taking (Wilson et al., 1984) are taken into account. Although developed to explain the mechanisms of turn-taking, the resource model seems particularly appropriate here. The model proposes that behaviours are not inherently dominant or submissive, but can be viewed as neutral conversational resources. Interactants have a number of resources which they may use as appropriate depending on the situation. In the case of 999 calls some of these resources would be interruptions, assent terms, question, offers and so on. In an urgent call it may not be appropriate to interrupt a caller, because what they are about to say may be important. Therefore, interruption would be an inappropriate resource for an operator to use. On the other hand questions are more appropriate here than in social telephone calls.

This suggests that the resources available to interactants can be of more than one type, that is, gaze, interruption, filled pauses, and speech acts would all be resources. Interactants can use any of these resources. Therefore, conversational management may depend on more than one type of behaviour and the type used may vary according to the situation. In the present study different types of behaviours did appear at each level of the intervention facet, indicating that interactants were using different types of resources for management. Researchers interested in a phenomenon such as control or dominance may find that it is made manifest in different ways in different types of interaction. Furthermore, manifestations of dominance in
one situation need not be linked to dominance in other situations. Thus we find that simultaneous speech can be a product of enthusiasm (Edelsky, 1981) or a sign of support (Kennedy and Camden, 1983). A speech style which appears to signal power in a courtroom (O'Barr, 1982) would also be appropriate, but for different reasons, in a counselling situation (Bradac, Wiemann and Schaefer 1987). Thus, although in any given situation behaviour may be ordered by its dominance or degree of intervention, the conversational events which are appropriate for use at each level of the facet may vary from situation to situation.

IMPLICATIONS FOR THE DESIGN OF COMPUTERISED SYSTEMS

In the first chapter the introduction of hi-technology to the use of the telephone was mentioned. While it would be risky at this stage of development to substitute a 999 operator with a computer, there are other calls which could be handled by computer, if not now then in the near future. Examples would be ticket booking lines or domestic appliance fault reporting lines. The findings of this study have implications for the design of such systems.

The first and most obvious implication is that there appears to be a need for an explicit beginning and end to the call. The beginning serves the function of letting the caller know who s/he is speaking to. The end of the call can be used to signal that the task is completed and, more importantly, that action will now be taken.

Secondly, there is a need to understand the callers' expectations of the call. Eardley (1983) found that nearly 60% of the public did not appreciate the centralised control system used by the fire brigade. This would affect their expectations of what should happen in a 999 call. The concept of a 'script' has been used to refer to an abstract summary of the events likely to occur in a situation (Schank and Abelson, 1977). These 'scripts' are used to enable a computer to give intelligent answers to questions about a situation without having all the information. For example, a restaurant script has ordering food as an expected event. Even if food is not mentioned in a specific
restaurant situation ("I went to Charlie Chan's last night and saw Marjorie with an older man"), a script allows a computer to answer that s/he also ordered and ate some food. In the case of human-computer telephone calls the use of 'script' could refer to the caller's mental representation of the likely course of events during the conversation. This 'script' may be coherent or fuzzy, depending on the situation. Thus a caller ringing to book theatre tickets may expect to name at least the performance and date required. The system could therefore be designed to expect these pieces of information and search the caller's speech for them before proceeding to ask for further details. This is linked to the need to treat different topics in different ways. Once the caller's 'script' is understood it should be possible to differentiate topics on the basis of the ease with which they can be addressed and decide on how the system should deal with each one.

A third implication regards checking and feedback. It is obvious that any computer system would need to check the information it has received. What is apparent from emergency calls is that checking is not only needed, but is an integral part of telephone conversations such as these. It is not necessarily unnatural or intrusive. Constant feedback is also necessary and a natural part of the interaction. This checking and feedback may also be used as a mechanism for control, in so far as the fact that information has been received can be used to signal topic change. This would be analogous to the operators' use of assent terms for both functions.

**IMPLICATIONS FOR TRAINING OF OPERATORS**

These three implications also hold for the training of 999 operators. Eardley (1983) recommended a public education programme to explain issues such as central control. While this would be useful, making a 999 call is a rare event for the general public and training people in detail for a rare event is not efficient. The calls are generally quite efficient and incorrect or irrelevant information were only two of the problems cited in chapter 5 as being linked to time wastage.
There may, however, be an advantage in teaching young children how to make emergency calls, as they may have neither the knowledge of what is required nor the ordinary telephoning skills necessary. It has been shown (Jones, 1980) that it is possible to teach four and five year old children to make emergency calls correctly, although daily 15-20 minute sessions over 2 week were required.

Simply because they deal with the situation every day, training operators to deal with the public makes more sense than training the general public. It should be noted that the operators who took calls in this sample only received training in the use of equipment, not in how to deal with the call itself. For this they relied on their own social skills. From the data presented here it would appear that these skills were quite adequate to deal efficiently with the majority of calls. The value of training would be in increasing efficiency for all calls and in giving operators skills to deal with the types of problems outlined in chapter 5 and by Eardley (1983).

While this training should address the issues of feedback to the caller and general conversation management skills, an important element in this training would be an understanding of the caller's 999 'script'. The difference in dealing with expected and unexpected information is best shown by the finding that while all questions about the road name were answered by the caller, 13% of those about the nearest side turning were not. This difference may be explained by the fact that only the road name is part of the callers expectations of an address. It is probable that operators already have an implicit understanding of callers' expectations, but this understanding needs to be made explicit. This would enable operators to deal more efficiently with a caller who does not realise that the operator may be five miles away, looking not even at a map but at a list of streets and without any knowledge of local landmarks.

The same training considerations apply to other professionals who have telephone contact with the public. In each case the caller's expectations need to be understood, especially as they relate to different sections of the call.
In calls with fewer time constraints there is no reason why unexpected questions should not be prefaced with an explanation. This would be true particularly for advice centres, where the adviser may need to carry out the equivalent of medical history taking in order to fully understand the caller's problem. There is a need to guard against the professional becoming so familiar with the system that they operate and with its jargon that they no longer consider their questions from the caller's perspective. An understanding of the caller's expectations would be useful here.

One possible extension of professional - public calls is in the area of fault-lines. The use of such services is quite common with computer hardware and software. Rather than calling out a service engineer, the customer explains his problem to the manufacturer or publisher over the phone and is guided through a checking system. This helps to pin-point the problem and even to provide solutions.

Given sufficient understanding of the public's knowledge and level of competence there is no reason why this system could not be extended to some household appliances. It may be some time before the general public is sufficiently sophisticated to actually fix such appliances as washing machines or television sets. A fault-line could, however, be used for fault diagnosis only. This would reduce the need for a call-out if the problem was found to be simple, or would at least ensure that the correct parts were available for the service engineer. This service would require training of operators so that they could deal with naive callers' terminology and could issue simple and unambiguous instruction.

The same principle of understanding callers' expectations applies to cases where the caller may need to prepare for the call in advance. A caller can be sent a check-list, but this list should include explanation for why certain items are needed, just as explanation would be needed for unexpected items in conversation.
Instruction reverses the situation found in 999 calls, in that the expert instructs (i.e. Offers) while the novice requests information. The expert's instructions for a task can be represented in hierarchical form, with the overall goal being the highest level and detailed instructions forming the lowest level. The expert must then change levels according to the novice's requests (Wintermantel and Siegerstetter, 1989). If, for example, an expert says "Take the lid off" and the novice replies with the question "How?", then the expert must move down the hierarchy to detail the component actions involved in taking a lid off.

This hierarchical approach could also be used in eliciting information. If the information to be elicited can be represented hierarchically, then the expert should concentrate on starting at the top of one branch and moving down. It has been found (Meyer, 1977) that questions regarding information on higher hierarchical levels can be answered better than questions about information at lower levels.

**DIRECTIONS FOR FURTHER RESEARCH**

In these calls different strategies were used for different topics. There was, however, only one task, even though it could be broken down into topics. It would be interesting to study conversations where two or more tasks have to be completed. The two tasks could simply involve information flowing in two directions. An example would be where one party needed to gather information and then issue instructions. This would allow conversation management used in the two tasks to be compared and contrasted. It would be of particular interest to examine whether roles switch in a conversation where information flow is two-way.

This study concentrated on one emergency service, fire, dealing with a limited range of incidents. The fire service is unusual for several reasons. Time is critical for this service, first because fires develop rapidly and second because this is the only service where attendance times are laid down by statute. Also, the fire brigade attend all calls where fire or the danger of fire is
reported, whether or not they feel that the report is genuine. The other two emergency services, ambulance and police, deal with a wider range of situations and with a wider range of time scales. They also have some option with regard to attending the incident and with giving some incidents priority to others. The operator may therefore require more information and the form of the information needed may vary from incident to incident. A comparison of emergency calls across services would highlight differences in the conversations which are a function in differences of the tasks. A comparative study would also highlight which elements of context are constant across different types of emergency calls. It is probable, for example, that while the operators' task and style may differ across services, the callers' would remain relatively stable. For the naive caller each situation is an emergency and as s/he is not aware of organisational factors within the various services, these should not affect speech style.

Two more practical issues call for research. First, it has been suggested above that the training of operators should emphasise, not only feedback skills, but also the need to understand callers' expectations and to deal with different types of information in different ways. In fact the operators who took part in this study were trained only in control room procedures and the use of the equipment. The longest call to a genuine incident in this sample lasted two minutes 10 seconds. At the end of that time the operator was still trying to get the name of the nearest main road, essential information in the case of that call. Two minutes may not seem a long time for a call until the carefully drilled sequence of events which follow the call are considered. If time were not so important in fire incidents, firemen would walk down stairs to reach the fire appliances instead of sliding down a pole. Once the 'shout' reaches a local fire brigade station everything possible is done to cut time as appliances rush, sirens blaring, to the incident. If the call receipt system could keep to within 10 seconds of its average call length of 45 seconds, one minute 15 seconds could have been saved in that one case. It would therefore be of applied interest to examine whether conversational skills training could make operators more efficient, either in terms of reducing the average time taken for a call or in terms of reducing the range of times.
Second, this study examined only genuine calls to incidents. Now that something is known about these calls it may be possible to make predictions about the difference between genuine and malicious calls. It has already been shown (Comber and Canter, 1983) that it is possible to differentiate malicious and non-malicious calls on the basis of non-verbal cues. The findings in the present study suggest that it may also be possible to differentiate malicious from non-malicious callers on the basis of the content of their speech. As malicious callers are under no real time-constraints they may, for instance, interrupt the operator less than genuine callers. It is also possible that people who make repeat malicious calls may show signs of having a complete and well developed script for the situation. In particular they may offer information about the nearest side-street, information which is normally elicited by the operator. This suggests that it may, indeed, be possible to distinguish between different types of malicious caller, for example between opportunist and repeat callers.

Some of the implications of this study for the examination of control and interaction management have been outlined above. The major implication is the importance of the context of the interaction situation, and in particular the interaction task, to the structure of the conversation. It may therefore seem that the next fruitful step is to devise a set of experiments where the interaction context could be manipulated. The situation and task can readily be manipulated in a laboratory. Leet-Pellegrini (1980) for example, used a problem solving task, thus placing interactants in a task-oriented situation. In contrast, Mulac (1989) used a discussion of such items as “What are the best ways to spend a vacation?”, thus encouraging a more socially oriented conversation. This ability to control the interaction situation is the major advantage of laboratory experiments. It can be seen that the study of emergency calls could be treated more rigourously if experimental control were possible. Such control would allow the inclusion of a face-to-face condition and balancing the number of men and women; each subject could act in each role or the same dyads could be compared in a task-oriented and a social context.
It would seem, however, that a number of the findings in the present study might not emerge from experimental work. For example, whereas Leet-Pellegrini (1980) found in an experimental task-oriented situation that males nominated as experts had a more 'expert' speech style than did women similarly nominated as experts, there were no sex differences between 999 operators of either sex in their use of interruptions, but women operators spoke more than did male operators. It would appear, therefore, that a simulated role and a real role have different implications for behaviour.

The problem with laboratory studies is that while there is a gain in control, the reality of the context is lost. To study 999 calls in a laboratory, the 'operator' and 'caller' could engage in role-play. Time constraints could be imposed by the experimenter. However, no matter how realistic a situation was devised, within the bounds of ethical considerations, there would be no real incident, no danger to life or property. The point about real urgency and real time constraints is that they cannot be simulated.

Furthermore, in naturally occurring calls the roles played by interactants are not simply defined by their task, but also by the experience of lack of it that they bring to the situation. For a caller, making a 999 call is an unusual event. For the operator the 999 call is part of everyday work and, while they have no training, they have more experience than could be achieved in any but the most ambitious experiment.

It appears, therefore, that there are certain conversational situations, of which 999 calls are an example, which cannot be examined in a laboratory. These conversations can be interesting material for research for two connected reasons. First, they tend to be of more intrinsic interest than conversations between undergraduates getting acquainted. Second, because of the importance of context, they throw light on theoretical issues in the use of speech and language. Two example from research illustrate this point. The first is Rutter's (1984) study of cuelessness in natural conversations, which has
already been cited. The second is Aronsson, Jönsson and Linell's (1987) study of speech accommodation in a courtroom setting.

Rutter (1984) replicated findings on the effect of cuelessness on the content, style and outcome of interactions first found in experimental work in a study of naturally occurring interaction, Open University tutorials. However, the specific findings for the content of speech were not actually those predicted. What was found was that the effects of cuelessness on the interactants' speech could be explained by the context of the interactions, and in particular by the roles of the interactants in that situation. That is, cuelessness led to increased role-differentiation, with tutors behaving more like tutors and students more like students. In natural conversations, then, the theory did not predict effects on specific dependant variables but rather the interacting effects of the independent variable and the context.

In the second example Aronsson et al (1987) studied the speech behaviour of lawyers and defendants during a trial from the perspective of speech accommodation theory (Giles and Smith, 1979). While their findings supported the theory, they found that some of the adjustments made by speakers could be seen as routinised adjustments to the role of the listener in the situation. That is, the legal professionals accommodated their speech style to the defendant, but only during certain phases of the proceedings. During speech directed at the court, rather than at the defendant, the lawyers used a more technical speech style. Once again the study of real life interaction could throw light on how theory is realised in practice.

It would therefore appear that the study of natural conversations has implications for theory development beyond those of laboratory research. Real conversations allow an understanding of how a process operates within the framework of the goals of the interactants and the context of the interaction. This understanding is essential to the development of theories of human communication which can be applied in the real world.
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APPENDIX A CODING SCHEME FOR SPEECH ACTS

The coding scheme was based on Conversational Exchange Analysis (CEA) developed by Thomas, Bull and Roger (1982). Full details of the scheme are given in Thomas, A.P., Bull, P. and Roger, D. (1982), Conversational Exchange Analysis, Supplementary publication no. SUP 5010-096 (26 pages). This document is available from The British Library, Boston Spa, Yorkshire, U.K.

Thomas et al report an overall rate of 3.93% inter-observer error for the act division rules and a Cohen's kappa of 0.969 (p<0.001) (Cohen, 1960) for observers' ratings of the Activity category (Thomas, Bull and Roger, 1982, p152)

Acts
An act is defined as a single thought or idea. The transcript division rules given in Thomas, Bull and Roger (1982) were followed in ambiguous cases. In the following examples single thoughts or ideas will be bounded by a back-slash (/).

Summary of Activity categories

GIVE
Offer refers to speech which initiates conversation by introducing information, opinions etc.

  e.g.

  (a)
  Caller There's a fire ah/

  (b)
  Caller My nest door neighbour's kitchen's on fire/

Reply refers to speech that is made by the other person in direct response to a request, where the information asked for is given

  (a)
  Operator What n district does that come under/
  Caller St Paul's Cray/
Insult

refers to acts that are verbally abusive

(a)
Why don't you push off?/

(b)
You rat/

Both from Thomas et al (1982)

Mand

refers to speech that has the function of asking for an action to take place and is, therefore, an attempt by the speaker to get the listener to do something

(a)

Operator  Yeah/ listen/ have you/ listen/

(b)

Operator  District./ what district is that?...Hello?

Threat

is a specialised form of mand by which the speaker commits himself to some course of action, conditional on the listener doing or not doing a specified action

(a)
If you don't come I'll be really upset/

(b)
Hold that or I'll spill my tea on you/

(Thomas et al, 1982)

Phatic

introducing information that is conventional and ritualised

Open

ritualised speech used to open a conversation

Operator  Hello fire brigade/

Close

ritualised speech used to close a conversation

Operator  Be there shortly/

Caller  Bye/

Operator  Bye bye/

Note: Distinguishing between phatic and close proved to be difficult, particularly for acts such as "Be there shortly".

SOLICIT
Appendix A

Request refers to speech in which a person is actively asking for information
Operator Yeh/ what road do you want us to come to?

Query refers to speech in which a person asks about information already in the public domain
Operator It's definitely Mitcham is it not?

? a request to have speech repeated
Caller Par'n?/

ACKNOWLEDGE
Acknowledge subsumes the acknowledge, consent, reaction and listener responses categories and refers to positive or neutral acknowledgement of the other person's speech
Operator And it's rear of the pub is it?
Caller That's right/

Modify refers to reflection, disagreement, negative evaluation or a suggested change to what the other speaker has said.
(a)
Operator And it's nowhere near the pub is it?
Caller It's right beside the pub love/

(b)
Operator It's definitely Mitcham is it not/
Caller Yeh it's Beddington Corner/

False starts refers to attempts at speech acts which are abandoned.

Test of the reliability of the coding scheme
To test the reliability of the coding scheme a sample of 11 calls were examined by a second coder. These calls were not chosen randomly but so that they filled one of two criteria. Either they had presented difficulties for first coder or they contained examples of the more unusual acts, which might not have appeared in a random sample.
The second coder studied the explanation of the acts presented above, together with the original coding scheme instructions (Thomas, A.P., Bull, P. and Roger, D., 1982). No further training was given, as this was seen as a test of the written coding procedure. The interactions were coded using both transcripts and tapes. All markings of intonation were removed from the transcripts so that the second coder could make her own judgements.

Once the coding was complete the two sets of results were checked for discrepancies. As the second coder had received no formal training, a first check was made by simply referring each instance of disagreement back to the written instructions. The remaining disagreements and their resolution are outlined below. Table A1 below presents a crosstabulation of the two sets of ratings. The category 'Missing' indicates a discrepancy in the coding of the number of acts. Rating of the number of speech acts was therefore included in the overall measure of inter-rater reliability as well as the coding of speech act types. A Cohen's kappa of 0.91 was found for inter-rater reliability based on this data.
Table A

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Case 1: Coding of questions as Phatics

Two examples are given below where there was disagreement on the coding of phatics. The distinctive aspect of phatics is that they are conventional, ritualised utterances.

Caller         I wonder if you can help me / I’ve set my grill on (fire)

The first act was initially coded as a Request but was coded by the second coder as a Phatic on the basis that, although this does not introduce information the phrase is conventional or ritualised. The initial coding as a request assumed that the question was not strictly rhetorical as it could be answered and is seeking an affirmative answer from the operator. The coding as a Phatic is probably more correct, however, as the phrase can be considered a ‘filler’ before the main part of the caller’s speech.
Appendix A

Operator    Hello fire brigade can I help you

This was coded by the first rater as an Open. The second rater classified "can I help you" as a request. On the basis of the example above this should be a phatic and in this case a phatic which opens the conversation, therefore as an Open. As such the utterance should stand as one Open.

Case 2    False starts as speech errors only

Operator    Yeh / which road

Operator    Yeh /but what is it what is on/ yeh

Both of these were initially coded as Requests but as a false starts by the second coder. In the second case it is clear from the context that the operator is asking what is on fire. In both cases the speaker stops because of interruption, not because the act has been abandoned. In the first case the act stands as a complete Request, even with interruption. Therefore, as a false start is a type of speech error, it was agreed that the coding as Requests stand, and the instructions for false starts amended so that only speech errors are counted as such.

Case 3    Acknowledgements being more than a few words

Operator    Yes OK so actually creepers alight on the house

Coded as two acts by the second coder, an acknowledge followed by an Offer. It was agreed that as no information is introduced here, this being a summary of what the caller has just told the operator, this turn is an acknowledgement of the caller’s previous speech.

Case 4    Use of intonation to distinguish between Query and Acknowledge.
Caller  . . . at the Maskal close at the back of the garages there's a
       motorcycle on fire and the petrol is going all across the road
Operator  That's Matchval close

Operator  ..... and what district is it there
Caller    Am Tulse Hill
Operator  Tulse Hill

Two operator utterances were coded as Acknowledgements by the first coder
and as Queries by the second. The different interpretations were both based
on intonation. Queries are distinguished by an interrogative intonation,
usually a rising pitch at the end of the utterance. The raters could not agree
on the pitch movement. This problem can only, therefore be resolved by
using a third rater. However, the problem only occurs in these instances of
part of the caller's utterance being repeated by the operator.
APPENDIX B: EXAMPLE TRANSCRIPTS

The following are five example transcripts taken from the corpus. They have been chosen randomly. In each case parts of the address and telephone number have been removed and replaced by capital letters or the numbers one, two and three.

Call 2/9 - Special services - Operator female - Caller female

O Hello fire brigade
C Hello yes can you send somebody down the eh XXXX Estate YYYY House there’s somebody caught in the lift
O Yeh what house?
C Ah YYY it’s the second block in
O Yeh what road do we come to?
C Eh road is Kidbrook Park Road
O Yeh and a road that comes off Kidbrook
C Oh ah Cambert Way
O . Yeh is it actually in Cambert Way?
C Yes
O It is and that S E what?
C Yes Ah pardon?
O That’s S E what . what part of London is it?
C Oh S E three nine Y D
O Yeh okay then we’re on the way
C Only is ah in the ah in the Ronald House the second block in
O Yeh okay then we’re on the way thank you
C Okay yeh Bye bye
Call 13/30 - Fire - Operator female - Caller female

C        Hello
O        Fire brigade
C        Forty five XXXXX Road New Malden there’s a car on fire in the drive
O        Forty five what road?
C        XXXXX Road New Malden
O        Ha How do you spell that?
C        XXXXX
O        XXXXX Drive?
C        Road
O        Oh road New Malden?
C        Yeh Win (.......) church is on the corner
O        . Alright what’s the main road near there?
C        .. It’s the fourth coming up from the fountain
O        Yeh what’s the name of the main road there?
C        The Malden Road
O        Okay then we’ll be along thank you bye bye
Call 15/23 - Fire - Operator male - Caller child (male)

O  Fire brigade
BT  Speak up
C  Yes hello am there's a fire at number eighteen XXXXXX Close
O  How's that spelt
C  am oh X X X double X X I think
O  XXXXXX Close?
C  XXXXXX close yeh by Hazel Grove
O  Yeh
C  And ah well Adlington Grove that area
O  Yeh and what district is that
C  Sorry?
O  Where's that what district
C  It's Sydneham S E twenty six
O  S E what's the phone number you're calling from?
C  One two three six oh three nine
O  six oh three nine?
C  Yeh
O  Yeh and what's on fire exactly
C  I don't know to be quite honest there a ah old lady am there and
she's standing kinda helpless
O  Yeh
C  Thanks a lot
O  Okay we're on the way
C  Bye bye
Call 17/11 - Fire - Operator male - Caller male

O  Hello fire brigade speaking
C  Yeh hello I've just walked past a post box in Bourne Way in Hayes and it's am alight there's a fire inside it
O  Ah you say Bourne Way
C  Yeh it's am half way down Bourne Way about half ways between am Typigs Lane and Hayes Station Approach
O  Yeah lovely we've ad a call to it we'll should be there any second now anyway alr
   Okay?
C  Alright thanks for calling
O  Bye
C  Bye
O  Bye bye
Call 40/16 - Fire - Operator male - Caller male

C Kitchen up in smoke

BT Go ahead

O Hello fire brigade speaking

C (cough cough) Me kitchen's on fire (cough) em (cough)

O What's your address?

C (cough) Thirty five XXXXXX Road

O What road?

C XXXXXX X X double X X X X XXXXXX Road West Norwood south east twenty seven

O . XXXXXX Road South east twenty seven telephone number you're calling from please

C Sorry?

O Your telephone number

C It's (cough) one two three four eight one four

O Four eight one four

C Yeh

O What end of XXXXXX Road is it

C Ah (---------------------)

O Alright we've got the road alright we'll be down bye bye

C I can't breath