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# Discourse analysis and pragmatics in the design of a conversation prosthesis

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## Introduction

The Microcomputer Centre at the University of Dundee is involved in developing communication devices for severely physically disabled non-speaking people. Existing communication systems are suitable for message-passing, but are inadequate for enabling an approximate form of real conversation. The authors have been working on a system which views a conversation in terms of pragmatics, and whose design is derived from this starting point. This paper describes the pragmatic issues which were found to be relevant and the principles on which a prototype communication aid is based.

### **Physically disabled non-speaking people**

If someone is so physically handicapped through paralysis or spasticity that they cannot speak, they will usually have great difficulty operating any sort of input device to a computer system which might communicate for them. A typical input device is a single switch, which is closed when a scanning program presents the desired choice on a menu screen. However, the very slow rate of communication which this permits effectively excludes the impaired 'speaker' from conversational interaction with others. Existing systems allow the user to make up and output a message, the basic unit being a letter, word, or stored phrase. The rate of communication with even the most advanced system and an experienced user is still very low, typically 2 to 10 words per minute.

### **Design for a pragmatics-based communication aid**

The authors' work on increasing communication rate through predictive methods [1] led to an *entire conversational move* being considered as the minimum unit of communication. This coincided with the view that there was a need for systems to reflect the pragmatic aspects of interaction, and not just the information transfer function [2].

The conversation system we are designing is based on the premise that pragmatic issues are at least as important as information content, and often are more important. Speaker goals which we have identified as particularly important in any conversational encounter are (a) achieving participation in the interaction, and (b) expressing the individual's personality through that participation.

We have undertaken a study of what is known about the ways in which unimpaired speakers achieve these goals. From this information we have selected a number of tactics which we have incorporated into a demonstration system. The system is called CHAT, which stands for Conversation Helped by Automatic Talk. We describe below the pragmatic features of ordinary speech which help the speaker achieve the goals of participation and expressing personality, and the ways in which we have modelled these in the program that controls the communication system.

### **Achieving participation in the interaction**

#### *The importance of communication rate*

Unimpaired speakers have little difficulty in achieving participation in conversations, unless the other speaker is particularly difficult to interrupt, but an extremely low communication rate makes this a substantial problem for disabled non-speakers. By the time an utterance is created and output, the conversation has long since moved on. Much of our speech in fact is concerned with simply remaining part of the discussion, regardless of content. Extended non-participation by one of the conversants is interpreted as reflecting disagreement or discomfort (Levinson 1983, p. 320 [3]; Newman 1982 [4]). In general, silence is perceived as undesirable in a conversational interaction. One purpose of speech is simply the prevention of silence during a conversational encounter.

To help a disabled person achieve this continuity of conversation, we have designed CHAT to minimize the waiting time between utterances. It does this by giving speed of output a higher priority than precise control over every aspect of what is said. This is particularly appropriate when the minimal unit is a speech act, rather than a particular phrase.

Another way CHAT increases the speed of output is to have the user prepare text in their own time, for outputting later at a faster rate, when the occasion is appropriate. For the more predictable parts of a conversation, the preparation can be minimal. For topic discussion, however, it will require of the user the same sort of planning which anyone does before a particularly important conversation. This does require an extra

effort from the disabled non-speaker, but as at present they are in many cases completely cut off from a wider social world, the choice can be seen as between a degree of pre-planning and no conversation at all.

*Ritualized utterances*

A large number of speech acts are used as part of an interactional ritual, and their form is pre-patterned. (Goffman 1981 [5], Gumperz 1982 [6], Schegloff and Sacks 1973 [7], Laver 1981 [8]). We have built these rituals into our system. Greetings routines, for instance, are heavily ritualized. The usual greeting sequence is an exchange of such remarks as:

- A: Oh, hello, B. How's it going?
- B: Not bad, thanks, A. How about yourself?
- A: Yes, fine, fine. Keeping busy.
- B: What about this weather we've been getting?

The speech acts in this encounter usually occur in the sequence as shown, that is, in the order:

- A: RECOGNITION  
VERBAL SALUTE  
PERSONAL ENQUIRY
- B: RESPONSE TO PERSONAL ENQUIRY  
PERSONAL ENQUIRY ABOUT OTHER
- A: RESPONSE TO PERSONAL ENQUIRY

A or B: SMALLTALK.

Departure routes also follow a predictable pattern, with pre-closing remarks establishing that both speakers are ready to finish before farewells are made.

*Feedback remarks*

A great deal of casual conversation has as its primary purpose simply interacting in a pleasant way with other people, and thereby ensuring the maintenance of the speaker's position as a positively regarded member of the social group (Allen and Guy 1974, p. 7 [9]; Tannen 1982, p. xv [10]). Important in this process is the giving of feedback to another speaker, to denote continued attention, agreement, puzzlement, and so on. Conversation is in fact an event which is created simultaneously by the speakers (Dore 1979 [11]). It is helpful at times to analyse conversations in terms of alternating speaker turns, but this is an over-simplification. The listener must be as active as the speaker for the conversation to seem satisfying.

Y	Yes			N	No
1	Acknowledge	5	Evaluate good	7	Request repeat
2	Agree	6	Evaluate bad	8	Request more info
3	Disagree				
4	Don't know			W	Go to wrap up remark
				M	Go back to main menu
		9	Filler phrase		

Figure 1. Feedback remarks control screen.

We have included in CHAT a range of feedback remarks which are available for the equivalent of one keystroke. This is an instance where timing is important for the remark to have its effect. The feedback remarks available were chosen so as to cover as large a range of situations as possible. The menu used to select these is shown in Figure 1. Examples of utterances produced are:

ACKNOWLEDGE	Uh-huh I see Well well
AGREE	Yes, I'm with you on that
EVALUATE GOOD	That's really good Oh good
REQUEST MORE INFO	Could you say a bit more about that?

#### *Using the other speaker's name*

One way we achieve bonding with others is to refer to them by name. If we never do this, our conversation will convey an impersonal impression. The CHAT system holds a list of people known to the user, and automatically includes their name at appropriate points in the output.

#### *Controlled random variation in output*

If we use exactly the same phrases on a given occasion, we risk conveying a negatively mechanical impression. Throughout the CHAT system a degree of random variation in output operates, so that, for instance, repeated requests for a feedback remark to denote continued attention (ACKNOWLEDGE) will produce a sequence such as 'Yes . . . I see . . . Uh-huh . . . Oh yes'. This random selection from a set of appropriate possibilities is controlled so as to keep identical forms far enough apart in the sequence to avoid awkward repetition.

#### *Controlling the conversational flow*

As well as allowing some sort of interaction, speech is used to influence and control the behaviour of others [12]. There are a range of techniques we use to try to control and manage the conversation process itself, such as ways of breaking in on a conversation, and holding the floor until we are finished with our contribution.

CHAT's emphasis on speed of response increases the user's chances of being able to interject timeously into a conversation. Often, the impact of a comment crucially depends on its timing.

CHAT's ability to hold large amounts of text allows the user to take control of a conversation by telling an extended story or joke, or go through a long monologue of any sort, stopping for comments, or other repartee with the listeners as desired.

In designing CHAT we have been conscious of the importance of conversational fillers in casual talk [13,5]. Far from being irrelevant bits of noise in the conversation, utterances which carry no intrinsic meaning are used for a variety of important goals. They can be used to forestall interruptions, when the speaker is formulating the next utterance and does not want the gap in transmission to be perceived as an offer of the speaker turn to others. Fillers can also mark the participation of the speaker in an interaction, without requiring any new information to be added, as we have noted with the feedback remarks which simply denote continued attention.

#### **Expressing the individual's personality through the interaction**

An important purpose of conversation is to express the speaker's personality. To use Schank's terminology [14] in telling a joke, the speaker's *plan* is to tell a joke. The speaker in doing this will have several *goals*. The obvious one is to entertain the others present, but equally a goal might be to portray him/herself as a particular

sort of person, depending on the joke chosen. In fact it is difficult not to convey something about one's personality in the joke chosen. This is a particular example of the maxim that, in a conversational setting, it is impossible not to communicate [15]. As noted, silence, or minimal participation will carry an interactional meaning, intended or not. The avoidance of unintended silence and the control of silence for conveying meaning are important aspects of conversational interaction.

### Setting of mood of conversation

CHAT has the ability to change the mood of all subsequent utterances. The user can, with one command, alter the emotional tone of the output. This is done by storing multiple copies of all the more standardized speech acts. So far we have produced utterances in four moods: polite, informal, humorous, and angry, but the number would depend on the preferences of the user.

The main control screen for the current version of CHAT is shown in Figure 2. This and the control screen for feedback remarks are the only menus needed. The window in the centre of the screen shows CHAT's prediction for the next move wanted. If this is correct, the user indicates choice 1 — Speak and move on. A suitable utterance is selected and output, and CHAT moves on to predict the next utterance type wanted. It is also possible to say something appropriate for that stage and remain there, such as when saying 'hello' or 'goodbye' to a number of different people. A filler phrase can be output at any time by making that selection. The mood can be changed with one keystroke. The ability to go directly to any of the stages and say an appropriate utterance means the user can over-ride CHAT's predictions easily if wanted.

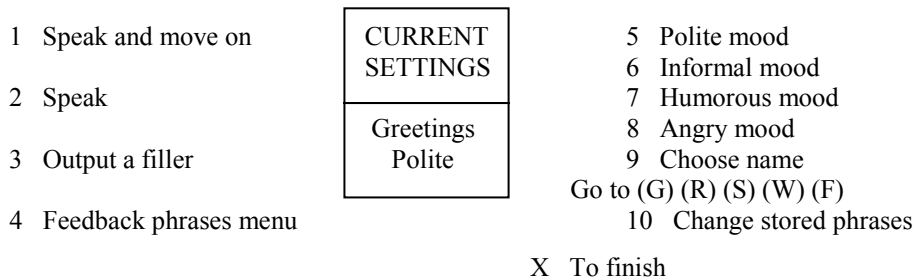


Figure 2. Main control screen for CHAT program.

### Large store of text

It is planned to have a CHAT-type system containing a large store of conversational material, including extended texts. Being able to recall this material as part of a free-flowing conversation will allow the user to express their personality, in the way that up to now, only a few particularly talented disabled people have managed, through laboriously writing novels, autobiography, and poetry.

### Conclusions

Approaching the design of a communication system from the point of view of its pragmatics has proved helpful in producing a prototype for a new type of conversation prosthesis for severely physically disabled non-speakers. A demonstration of this sort of system, CHAT, will allow a severely disabled non-speaker to navigate through the more predictable and formulaic parts of a conversation with a significant increase in rate compared to existing systems. We are working now to improve the system's performance in this area, and also to extend the same design principles to create a version which will help with topic discussion.

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