Pragmatic Analysis of Teachers' Language. Towards an Empirically Based Approach.

Kaska Porayska-Pomsta, Chris Mellish, Helen Pain

University of Edinburgh
Division of Informatics, ICCS
80, South Bridge, Edinburgh EH1 1HN
United Kingdom
{kaska, chrism, helen}@dai.ed.ac.uk

Abstract

This paper provides a foundation for a pragmatically and empirically based model of the mechanisms involved in teachers' speech act generation. Apart from some standard types of speech acts such as questioning or asserting, teachers also make use of some complex acts which combine the qualities of other known types of speech acts. These complex acts may be crucial to our understanding of the relation between language and cognition and therefore it seems important to analyse and to classify such cases appropriately. Unfortunately traditional approaches to speech act classification (e.g. Austin, 1962; Grice, 1975; Searle, 1979) do not provide a fully satisfactory basis for such an analysis because they treat speech acts in terms of discrete categories. On the other hand, although a number of alternative, more socially-based approaches (Givón, 1989; Brown and Levinson, 1978; Spencer-Oatey, 1992) are very inspiring, they are often left in the sphere of speculations and untested intuitions. To remedy this problem we propose an exploratory study of which the aim is to provide empirical foundations for a new model of teachers' speech act generation.

Introduction.

The primary concern of this paper is to provide the foundations for a *pragmatically* and *empirically* based model of teachers' speech act generation. The focus is particularly on modelling teachers' decisions with respect to certain complex speech acts which seem to fulfil several different communicative functions simultaneously. Our current interests also lie in investigating the decisions that teachers make with respect to different forms of speech acts that have the ability to express similar illocutionary force[1] in identical circumstances.

As part of our general goal, we would like to find a method for classifying these various speech act phenomena and to use it as a foundation for a Natural Language Generation system. We imagine that such a system would in turn form part of an Intelligent Tutoring System. The motivation for investigating these issues is both educational and linguistic in nature.

We believe that studying teachers' linguistic decisions in given educational situations may provide valuable insights into the nature of the relationship which apparently exists between language and cognition (e.g. Vygotsky, 1978; Piaget, 1985; McKendree *et al.* 1998 and indirectly studies in cognitive psychology such as Boroditsky, 1999).

Motivation

Considerable work has been done already with respect to the relation between different linguistic forms and pedagogical goals, primarily the DISCOUNT scheme (Pilkington, 1999) designed for analysing educational dialogues as well as work by (Graesser and Person, 1994). However, as Pilkington observes, questions regarding the effect that a teacher's choice of one particular linguistic form over another may have on a student's learning still remain mostly unanswered.

The predominant motivation for an empirically based model comes from our previous studies of teachers' language (Porayska-Pomsta, Mellish and Pain, 1999 and 2000). In these studies we have analysed two sets of real educational dialogues: the Polish[2] and the Pittsburgh[3] dialogues. Based on these, we have demon-

[1] We use illocutionary force in a purely Austin -like way to mean "the force or intention behind the words" (Austin, 1962, as cited in Thomas, 1995, p. 49).

[2] The Polish dialogues come from the transcripts by Wojtczuk (1996). The samples analysed were of interactions between 3 teachers and their respective groups of pupils. Their domain was literary analysis.

[3] The Pittsburgh dialogues were gathered for a project entitled *A Computational Model of Tutorial Dialogue*. The project is sponsored by the Office of Naval Research, Grant No. N00 014-91-J-1694. The corpus was collected by Carolyn Penstein-Rosé, Barbara Di Eugenio and Johanna D Moore all

strated that, in addition to some standard types of speech acts such as acts which question or assert (Fig. 1 example (b) to (d), and example (e) respectively), teachers also use certain complex speech acts such as *hidden negatives* which perform more than one communicative function (Fig. 1 example (a)). Hidden negatives are speech acts which appear usually in an interrogative form. They also seem to have a negative assertive force caused by the presence of the polarity items such as *but*, *nothing else, however*, etc. These items along with conditional forms of verbs and IF-THEN frames which are often present in hidden negatives, allow for a negative assertion (in this case – "Heat does not make light bulbs to light up.") to be **hidden** within the question, i.e. no explicit negation is used. It is precisely the covert character of their negativeness that the hidden negatives derive their name from (Porayska-Pomsta, Mellish and Pain, 2000).

Another phenomenon, which emerged from the analysis of the two sets of dialogues, is the variety of different speech act forms which teachers use to express similar illocutionary force in educationally similar or even identical circumstances. This is also illustrated in Fig. 1.

CONTEXT:

TUTOR: What is the one (the most important) thing that a light bulb needs in order to light up?
STUDENT: heat *(wrong answer)*

TEACHER'S LEGAL FOLLOW-UP QUESTIONS:

a. Well think about it this way, if you put the light bulb in the oven, it would certainly be getting a lot of heat, but would it be likely to light up?
b. Does a light bulb need heat in order to light up?
c. Is it heat that is needed or something else?
d. Why do you think that a light bulb needs heat in order to light up?
e. Heat is not needed for lighting a light bulb. Try again.

Figure 1. The context and teacher's follow-up questions come from the Pittsburgh dialogues. Question (a) is the actual follow-up to the student's incorrect answer. Other examples are adapted to this particular context with the forms of speech acts being kept the same as they appeared throughout the dialogues.

In the case of the latter phenomenon, the question that we would like to address concerns the factors that may cause a tutor to choose one form of speech act over another illocutionarily similar one. Are the choices purely random or are they actually based (at least partially) on conscious decisions of teachers who may want to achieve specific goals in given educational circumstances with particular students?

of whom we gratefully acknowledge. For details of the project see Penstein-Rosé, Di Eugenio and Moore. (1999).

Given the nature of educational dialogues which, unlike many other types of conversational exchanges, are very much goal driven, we would like to postulate that the fact that a large variety of speech acts can be used in similar circumstances by the same teacher, and the complexity of hidden negatives, both have specific educational and communicative functions needing to be identified. For that purpose it is necessary to classify these phenomena according to the linguistic and educational circumstances in which they tend to occur.

The Limitations of existing taxonomies.

Neither hidden negatives, nor the fact that many different forms can be used to express similar illocutionary force in identical circumstances, can be incorporated easily into existing speech act classifications. In Porayska-Pomsta, Mellish and Pain (2000) we discuss the main reasons why this is the case. The major problem seems to be that the existing pragma-linguistic approaches to speech act analysis (Ordinary Language Philosophers such as Austin, 1962; Grice, 1975; and Searle, 1979), as well as those approaches specifically concerned with educational dialogue (e.g. Sinclair and Brazil, 1982; Lehnert, 1978; Pilkington, 1999), slot speech acts into discrete categories often with only a single illocutionary force assigned to them or, in case of the Sinclair and Brazil, with a clear-cut syntactic category defining them.

The implication of the work by the Ordinary Language Philosophers is that all speech acts can be classified in terms of explicit (after Thomas, 1995) or implicit, but in any case discrete, performatives (Austin, 1962), by assuming a single and clear-cut conversational implicature for each speech act (Grice, 1975), or by categorising speech acts only in the terms of their paradigm cases (Searle, 1979). The discrete nature of Searle's approach is particularly visible in the case of indirect speech acts which, he claims, are acts that are performed by means of other speech acts (Searle, 1979, p.60). The most typical example of such an act would be a request or command under the guise of a question as in the case of *Could you please pass the salt?* Searle's explanation is driven by the view that speech acts can be identified always as distinct from one another and as such the qualities of different acts cannot overlap with each other.

Givón (1989) observes that one of the problems with this kind of categorisation is that it ignores the high frequency with which indirect speech acts occur cross-linguistically. For instance, studies such as Brown and Levinson (1978) show that indirect speech acts are used systematically across languages to perform the same range of communicative functions. Consequently, this

suggests that they deserve to be classified in their own right. The fact that they involve qualities of more than one of the types occurring most frequently across human languages also suggests that they represent much less clear-cut phenomena than the absolute type of categorisation that Searle and his predecessors permit one to reveal.

The case of indirect speech acts is particularly relevant to both of the linguistic phenomena under investigation here. We have already mentioned that hidden negatives seem to have multiple forces: one could be characterised as a negative assertive force and the other as a questioning (or testing) one. Thus, hidden negatives, just like the classic indirect acts (of the salt type), make use of the qualities of more than one type and potentially they should be subject to similar categorisation criteria as the indirect acts. Indeed, despite the fact that unlike indirect speech acts hidden negatives fulfil the functions of all the types involved, they can vary with respect to the directness of their negative assertive force. This variability is usually due to the presence and number of polarity items in a single hidden negative as well as due to whether or not conditional forms are present[4].

In order to grasp the nature of hidden negatives - which is necessary to enable us to predict the types of effects that such acts may have on students - it is necessary to explain why and exactly in what way hidden negatives share the characteristics (or goals) of other types of speech acts. All of the speech acts in Fig. 1 have a testing element to them (i.e. a teacher can use any of them to test a student's knowledge further) and with intonation appropriately placed in each of the examples, all of them also carry a negative assertive force (each of them can be used as a follow-up question to a student's erroneous answer). Thus intuitively, all of the examples belong to the same type of acts which fulfil more or less the same communicative functions.

Based on the dialogues studied, speech acts such as the ones in Fig. 1 are used by teachers in similar circumstances on a regular basis. Note that combining the qualities of different paradigmatic types of speech acts in one act must be quite costly on the speaker as well as the hearer. In the case of the example used, and given the Principle of Parsimony[5] (Carletta, 1992), it would be much simpler for a teacher to make a negative assertion followed by a question. Indeed, there are instances (in the Pittsburgh dialogues) where the same teacher, in identical circumstances, but with different students, uses precisely this simpler linguistic strategy. In contrast, using the more costly way of communicating seems to be not only against the Principle of Parsimony, but also against the basic, common sense approach to teaching which dictates that things ought to be made clearer rather than more complicated for students.

Unless we are dealing with very incompetent teachers, there must be some definite purpose in using the more complex strategies. This suggests that speech acts, which somehow combine the qualities of more than one paradigmatic type, should be treated in their own right. It also allows for a speculation that there are some external factors, for instance consideration for a student's lack of confidence, that affect teachers' choices of particular linguistic forms. This is particularly visible with clear-cut examples such as the choice between a hidden negative vs. a straight negative assertion followed by a question. We also believe that such external factors might contribute to the more subtle differences between instances in Fig. 1.

Givón's approach

If the complex speech acts are viewed in their own right, then it becomes apparent that an approach to categorisation that relies on clear-cut distinctions between speech acts will not be particularly useful in accounting for them.

An interesting view that addresses these issues has been proposed by Givón (1989). Givón's proposal of how to deal with both the non-discrete nature of language and with the relation which seems to exist between various speech acts, is to assume the notion of categorial (or prototypical) peaks. Such peaks represent the most prominent types of speech acts in a given language. The prominence of the types is measured by observing how often a speech act with the same force occurs in a language. Several cross-linguistic studies have been carried out which show that there are around four types[6] of speech acts occurring with great regularity across many different languages (e.g. Sadock and Zwicky, 1985 as cited by Givón). Givón calls these types prototypes to reflect their non-discrete nature - hence categorial peaks are also referred to as prototypical peaks.

Categorial peaks constitute linguistic landmarks between which lie a potentially infinite variety of different species of other speech acts. The character of a speech act, its form and ultimately its force, is determined with

[4] For a detailed analysis of hidden negatives see Porayska-Pomsta, Mellish and Pain (2000).

[5] The Principle of Parsimony implies that speakers tend to make as little effort as possible during linguistic communication.

[6] These are assertions, imperatives, and two types of interrogatives: WH-word and yes/no questions.

respect to how close or how far it is from a given peak. The characteristics of a speech act also depend on what other peaks are in its proximity. For example, the indirect speech act *Could you please pass the salt?* may be said to fall somewhere between two prototype peaks of imperativeness and interrogativeness (Fig. 2). This could explain why it has the form of a question, but the force of a command (or request).

The way in which a particular position of a speech act is determined, i.e. between which prototypes it is placed and how far it is from each of them, depends on a number of different *communicative factors*. Givón calls these factors, rather confusingly and interchangeably, *modalities* or *dimensions*. We will continue to refer to them simply as factors.

most prototypical imperative
a. Pass the salt.
b. Please pass the salt
c. Pass the salt, would you please?
d. Would you please pass the salt?
e. Could you please pass the salt?
f. Can you pass the salt?
g. Do you see the salt?
h. Is there any salt around?
i. Was there any salt?
most prototypical interrogative

Figure 2. Givón's example of a possible imperative - interrogative continuum (1989, p.154).

Givón lists five such factors which he claims affect the final forms of speech acts:

- **epistemic factors** concerned with graded truth in the Aristotelian sense with four grades: necessary truth (true by definition), factual truth (true as fact), possible truth (true by hypothesis) and non-truth (false);
- **subjective certainty factors** which correspond to speaker's beliefs[7];
- **social interaction factors** concerned with status, power, mood, character, confidence, etc., of the hearer;
- **intentional factors** which have to do with speaker's communicative goals, and
- **action factors** which are concerned with producing the actual speech act.

These factors are by no means discrete in nature as it is often difficult to determine the point at which one factor ends and the other begins. Furthermore, the factor values are often fuzzy too. This is particularly apparent in the case of social interaction factors such as confidence or politeness (e.g. what is a formal definition of *very confident* or *slightly polite*?).

Note that the combination of the non-discrete values of communicative factors determines the underlying non-discrete force (or *intention*) of any given speech act. It is only on that level that we can speak of speech acts in terms of Givón's classification. Once produced as utterances, these speech acts acquire discrete syntactic and phonological forms. It is one of our challenges to find an appropriate mapping between the non-discrete communicative factors and similar illocutionary forces of speech acts, and their respective discrete forms.

It is possible to extend Givón's proposal to hidden negatives which, we can say, fall somewhere in between the categorial peaks of (negative) assertiveness and interrogativeness. The actual speech act is therefore characterised in terms the degree of its proximity to either peak. In turn this degree of proximity is determined by the combined value of the non-discrete factors defining the context in which the speech act appears.

However, although potentially extremely useful for an analysis of educational dialogue, Givón's approach has also its troublesome aspects. It is not immediately clear, for instance, what might be the link between Givón's epistemic factors and teaching methodologies which, we would like to believe, play a part in teachers' choices of speech acts. What seems to be missing from Givón's explanations is the role that **all** of the factors mentioned by him play in speech act formation. So, while a teacher may choose to use a strong assertion based on her being sure that, for example, the student's latest contribution was incorrect, it is not obvious that the reason for her choosing a weak assertion would necessarily be caused by her low subjective certainty regarding any aspect of the tutorial. Other factors, such as her beliefs about the student's attitude, the urgency of the situation, etc. may be equally important.

In many respects Givón's approach seems rather vague and untested. This suggests that, in order to pursue his otherwise very inspiring approach, it is necessary to test its many different aspects, especially the ones concerned with the factors which play a role in speakers' linguistic decisions. In our case this will be done specifically in the context of educational dialogue.

[7] Although Givón does not say it explicitly, it seems from the references he makes that what is meant by these factors is in fact speaker's beliefs.

Politeness

One of the factors mentioned by Givón is that of politeness which belongs to his social interaction factors. There is a great body of research dedicated to the relationship between politeness and speakers' linguistic strategies (e.g. Leech, 1983; Brown and Levinson, 1978, 1987; Fraser 1990; Spencer-Oatey, 1992). An aspect of this research, which is especially relevant to us is the link that is made between politeness and varying forms of speech acts.

For example, Brown and Levinson's (1978, 1987) approach proposes that politeness is an expression of face-saving actions on the speaker's part. In this view *face* is defined as "the public self-image that every member [of a society] wants to claim for himself" (Brown and Levinson, 1987, p.61). According to this view *face* can be calculated on the basis of three main parameters: power, social distance and degree of imposition. Values on each of these parameters add to the overall 'weightiness', which in turn affects people's choice of strategy for implementing the act.

While, on the whole we agree with Spencer-Oatey and other researchers that there may be problems with the universality of this approach[8], it does inspire ideas with respect to the possible mechanisms underlying teachers' choices of linguistic strategies. Continuing with example (a) in Fig. 1, the complexity of the hidden negative could be due to a teacher wanting to help her student save face. The student could be lacking in confidence, and therefore the use of a straight negative assertion to tell the student that he was wrong might not only be embarrassing to him, but it could discourage him from further learning.

For our purposes, perhaps the most relevant contribution of the research on politeness and its relation to language is the recognition of the importance of context. Context is regarded as the crucial element in speakers' choices of linguistic strategies (Spencer-Oatey, 1992). Unfortunately, as many researchers have discovered, it is extremely hard to define it appropriately for all types of speech acts. Typically it is done in small steps by researchers concentrating either on investigating particular speech act types (always in limited numbers) and one or two variables at a time (Zimin 1981)[9], or on testing the effect of many different variables on the choice of linguistic strategy within one type (Blum-Kulka *et al.*, 1985)[9].

The variables, which are expected to affect the linguistic choices represent elements of a possible context[10]. The more variables are included, the richer and more realistic the context is expected to be. However it is important to bear in mind that in all of the studies, the actual choice of the variables themselves is arbitrary in that it relies merely on various researchers' social and linguistic intuitions. As Brown and Gilman (1989)[9] have shown, such intuitions are not always supported by the results of studies involving context[11].

Research into the relationship between politeness and speakers' linguistic choices is extremely instructive to us. In the next section, we present a detailed design of an exploratory study, which takes into account various aspects of speech act analysis derived from our own research to date as well as from Givón and the politeness theory. We base the design mainly on Givón's idea of a multitude of factors defining a context, which we narrow to the educational one. We also discuss the results of the first pilot study and the way in which the design will be improved.

The study

Givón's analysis of speech acts implies that their non-discreteness derives from communicative factors, which are also fuzzy in nature. Therefore if we are to follow his approach, we also need to accept that the communicative factors, along with their values and the way in which these values interact with one another, are the key to modelling speakers' linguistic decisions. This is why the main focus of the current study is on communicative factors: the influence that their respective values have on each other and ultimately on the way these values combine to trigger particular linguistic outcomes. Thus, the two main questions that we would like the study to address are the following:

1. What communicative factors are most relevant to given educational contexts?

and

2. Are there any regular correspondences to be found between certain combinations of communicative factors and the discrete speech act forms as expressed by means of utterances?

[8] It may not be appropriate to think of the teachers' linguistic choices merely in terms of power games or the degree of imposition. Certainly, on a purely social level this may play a role. However teachers, unlike most other speakers, are typically granted the right to impose and to force students into thinking and into sharing their thoughts with the rest of the participants of the interaction.

[9] As cited by Spencer-Oatey, (1992).

[10] Note that this corresponds roughly to Givón's factors, the combination of which could also be said to build a context.

[11] For example in one of their studies they found that, contrary to their (and many other researchers') expectations, greater social distance between interlocutors was associated with speakers' less polite strategies and lower distance with more polite strategies.

Hypotheses. Implicit in these two questions are three general hypotheses (**H1**, **H2** and **H3**) that we would like to test.

H1: *In any given context there is a small number of factors which speakers consider relevant (or salient)*[12]. So, while many different factors may contribute actively to creating a particular context, only a few of them will be crucial to it. The major motivation for assuming this comes from research on short-term memory and attention suggesting that in complex situations people can focus on, or recall, only their most prominent aspects (e.g. Baddeley, 1990).

H2: *People tend to agree on which factors are salient in a given situation*. Thus, to confirm this hypothesis, we would expect a small spread (i.e. large agreement amongst participants) with respect to the salience of a small number of the same factors for the same contexts.

H3 (relying on **H1)**: *There is a correspondence between different speech act forms and the combination of factors regarded as salient in a given context in which a speech act occurs*. The motivation for this hypothesis derives primarily from Givón's work as well from work on the relation between politeness and the choice of linguistic strategies.

Design. The study consists of two parts. The first part is designed to test H1 and H2; the second part is to test H3. The results from the two parts are mapped onto one another, in order to indicate the possible correspondences between a form of speech act preferred by a participant in a given context and the communicative factors chosen by a participant for that context.

Participants. Eight participants took part in the first pilot study. They were all university tutors with at least one year of teaching experience, but with no professional training. All were British English native speakers and took part in both parts of the study. In the second pilot as well as the study proper, we will use only professionally trained school teachers with at least one year of teaching experience. For the latter, we are hoping to use around fifty to sixty participants, so as to obtain a significant data sample.

Part 1

Materials and Procedure. Each of the participants was presented with five different situation[13] descriptions (see Fig. 3) and, in case of the first four descriptions, with a list of factors to rate in terms of their relevance (see left hand side of the '=' sign in Fig. 4). In order to check whether the results would be altered in any way, in the case of the fifth situation description the participants were given the flexibility to state the factors by themselves. They were asked to order them from the most relevant to least relevant one[14].

> You are faced with the task of teaching a student about electric circuits. In particular, in the context that we would like you to imagine, the topic on which you are concentrating concerns the components of a light bulb that make it light up. This is the last topic that you need to cover in the current tutorial and you have plenty of time left at your disposal. The current topic is not crucial, but it is useful for student's overall grasp of the subject. The topic is also easy. The student that you are dealing with is confident and has a good sense of humour. She seems bored with the lesson. Her progress is slow and her latest answer was partially wrong. Your rapport with the student is a formal one.

Figure 3. An example context description.

1. Educational goals
1.1 General goal = teach a general understanding of how electricity works.
1.2 Immediate goal = teach about the components of a light bulb.
2. Urgency of situation
2.1 Time left = plenty of time left
2.2 Number of topics left = 1 topic
2.3 Importance of the topic = not crucial
2.4 Difficulty of the topic = easy
3. Beliefs about the student
3.1 student's personality
3.1.1 confidence = confident
3.1.2 sense of humour = good sense of humour
3.2 student's attitude
3.2.1 boredom/interest level = bored
3.3 student's aptitude
3.3.1 speed of progress = slow
3.3.2 best match of student's last answer = correct
3.3.3degree of match of student's last answer = inexact
4. Rapport
4.1 formality level = formal

Figure 4. Values for the factors underlying the context description in Fig. 3.

The situation descriptions were constructed out of four main communicative factors: *Educational Goals*, *Urgency of Situation, Beliefs about the Student* and *Rapport*. All of the factors constitute independent variables as their values can be changed appropriately to alter some aspect(s) of a situation described. Each of the main factors (except for the Educational goals) can be assigned one of two available values. For example, *Difficulty of the topic* can take either the value *difficult*

[12] The word 'relevant' is used here to mean 'salient' as regards linguistic choices. In the remainder of the paper, we will use these two words interchangeably.
[13] We use the terms 'situation description' and 'context description' interchangeably to mean the same thing.
[14] Unfortunately the answers to the fifth context had to be disregarded due to the prior presentation of the list of factors for the first four situation descriptions, which largely suggested the answers to the fifth one.

or *easy*. In Fig. 4 the underlying factors are given for the example context in Fig. 3.

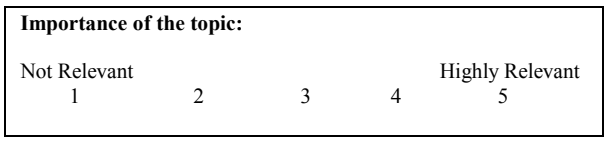

Figure 5. Example of the Relevance scale for the Importance of the topic

The list of the factors presented to the participants corresponds directly to the list used for building the contexts (Fig. 4). The values for each factor (see right hand side of the '=' sign in Fig. 4) were not disclosed to the participants explicitly, i.e. they were only given within a context description. A *relevance scale* was given with five values going from Not Relevant to Highly Relevant (see Fig. 5). The participants were asked to choose one of the relevance values for each factor. A relevance value indicates the salience of a factor as perceived by each participant. Relevance constitutes a dependent variable in the study, because its value for one factor may affect the values of the other ones.

Part 2

Materials and Procedure. This part of the study is dedicated to testing the correspondences between contexts presented to the participants in Part 1 and different instances of speech act forms. The same contexts as in Part 1 were given in this part. Additionally, the participants were provided with four pairs of speech acts (see Fig. 6 for an example) and were asked to choose one speech act from each pair on the basis of how appropriate they thought each of them was for a given context. Using four pairs of speech acts for one context was expected to increase the number of speech acts assessed for that context. It was also expected to provide the participants with a greater flexibility of choice. The participants were asked to order the three instances chosen in terms of their appropriateness for the given context and to give reasons for the order. To facilitate this, they were asked to specify whether or not politeness considerations influenced their choices and the order of speech acts and, if so, then in what way. To this end the participants were asked to scale the four speech acts chosen on the scale from 1 to 4, where 1 was Most Polite and 4 – Least Polite.

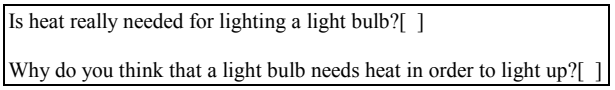

Figure 6. Example of a pair of speech acts that the participants were asked to choose from.

The pairs of speech acts were constructed on the basis of the instances such as the ones presented earlier in Fig. 2, which show that many different forms of speech acts can be used in the same contexts to fulfil similar goals. Other similar examples occurring in the Pittsburgh and the Polish dialogues were used to this end.

Measures and Expectations. The statistics that we propose to use for both parts of the final study are those of spread coupled with linear and, if necessary, multiple correlations (e.g. Hinton, 1998). The spread measurement is to provide us with an indication of the extent of the general agreement (or disagreement as the case may be) amongst participants regarding the corresponding aspects of the study. In Part 1 this will concern the importance (or prominence) of certain factors in given contexts. In Part 2 it will be with respect to the agreement about certain speech acts forms being more or less suitable in particular contexts.

The correlations are to provide us with some indication as to the effects that particular values of (the most salient) communicative factors have on one another. For example we do expect stronger positive as well as negative correlations between certain factors (e.g. between the time left till the end of a tutorial and the number of topics needing to be covered) than between other factors such as the rapport and student's boredom. It is one of the purposes of the study to establish the exact correspondences between different factor values.

For the first pilot study we limited ourselves to calculating the mean salience value assigned to each factor by the participants. For each factor, we constructed a table, which would show the mean salience of other factors occurring in the context of the factor for which the table was constructed. This enabled us to see more clearly whether or not any correlations exist.

Preliminary Results

The results of the first pilot study are by no means conclusive (they are drawn from a very small data sample), and the study needs to be modified for the subsequent runs. The results are both encouraging (for Part 1) and discouraging (for Part 2).

The results are encouraging, because they confirm H1, i.e. that certain factors along with their values **are** more salient than others, and H2, i.e. that there is general agreement amongst participants as to **what** factors are more or less salient. For example, on average the factor *Time Left* with the value *very little time left* tends to be more salient than that with the value *plenty of time left* (overall salience 4.6 and 4 respectively). Similarly,

Number of topics left with the value *more than one* tends to be more salient than that with the value *one topic left* (salience values 3.8 and 2.9 respectively). Within other factors such as the *Difficulty of the topic*, the average differences between values *difficult* and *easy* tend to be less (3.9 and 3.8 accordingly).

Also, our preliminary analysis revealed clear correlations between various factor values. For instance, the presence of an increased value of the factor *one topic left* reduces the salience value of *difficult* (3.75) suggesting a negative linear correlation, while considerably increasing the salience of the same factor with the value *easy* (4.6) suggesting a positive linear correlation. Similarly, in the same context, the value *plenty of time left* increases (4.1), while that of *very little time left* decreases in salience (3.5). Similar correlations can be found between other factors.

Although a much bigger data sample is needed and proper correlation statistics have to be applied to confirm these results, the first pilot provides some promising results, which confirm our hypotheses for this part of the study. Only small changes such as re-wording of instructions seem to be needed for this part. The correlations, if indeed confirmed by the final study, provide a useful tool for modelling the contextual aspects of educational dialogue in a way that conforms to Givón's idea of non-discrete communicative factors. The fact that there are clear differences in the perceived salience of different factor values (described appropriately in the study by means of fuzzy linguistic terms) provides a very solid basis for differentiating between the particular conditions that need to be met in order to trigger specific linguistic decisions on the speakers' part.

Part 2 of the current study was constructed to identify speakers' preferences with respect to speech act forms in given contexts. Unfortunately the design failed to trigger the expected reactions of the participants. On the whole, they found this part confusing and speech act forms too similar to differentiate between. One of the reasons for this seems to have been the fact that the participants found it impossible to focus on the form (or style) of the speech acts provided, instead focusing on their content in relation to the specific domain of electric circuits. This is clearly not what was expected from this part of the study. It is possible that providing ready speech act forms from which to choose, instead of giving the participants a free hand in formulating their own linguistic reactions to the situations described, also contributed to this effect. An obvious solution to this, which we would like to test in the second pilot study, would be to invent a fictional domain with which the participants would have little familiarity. This would hopefully shift the focus from the content of speech acts to their form. The second pilot is thus needed for Part 2 of the study, prior to running both parts 1 and 2 in the study proper.

Conclusion

In this paper we have presented some evidence of the complexity of the language used by teachers. We claimed that this complexity may be linked to specific strategies that teachers use to achieve certain educational goals. We discussed some evidence from research in pragmatics (Givón 1989; Spencer-Oatey, 1992), which clearly shows that speakers in general use language in strategic ways. Therefore, it seems not only valid, but also imperative for researchers concerned with educational dialogue to study teachers' language from this perspective.

However, we have also shown that the complexity of certain speech acts used by teachers (hidden negatives), and the fact that many different forms of speech acts may be used to achieve what seem to be the same communicative goals, makes the whole task of analysing and classifying teachers' language non-trivial in nature. The main problem arises due to the traditional approaches treating language in terms of discrete categories which, on the whole, are not capable of accounting for many complex linguistic phenomena in a useful way.

Research in pragmatics such as that by Givón, as well as that concerned with the relationship between language and politeness, has proved very inspirational to us. We conclude that in order to account for the complexity and the educational effects of teachers' language, not only does it need to be analysed in a non-discrete way, but also the analysis needs to be backed up by empirical evidence. We have presented a design for an exploratory study, which demonstrates how one may go about testing for the correspondence between various aspects of the context and the language used. We have briefly summarised the results of the first pilot study, which has provided us with further clues as to how to improve the study. We have shown that while, in part, the results are encouraging, there are some problems in the design that need to be solved in order to provide us with the required data. We plan to run the second pilot as well as the study proper in the immediate future and report the results later this year.

Acknowledgments

The first author would like to thank the EPSRC funding agency for sponsoring her research (grant no. 98318153), Prof. Johanna D. Moore for making some of the data analysed in this paper available, as well as Dr Michael Ramscar for his comments on the design of

the study, as well as Carlo Iacucci for his useful comments on the earlier version of this paper.

References

Austin, J. (1962). *How to Do Things with Words*, Cambridge University Press.

Baddeley, A (1990). *Human Memory*. Boston, Ellyn and Bacon.

Boroditsky, L. (1999). First-Language Thinking for Second-Language Understanding: Mandarin and English Speakers' Conception of Time. *Proceedings of the Twenty First Annual Conference of the Cognitive Science Society. Hahn, M. and Stoness, Scott C. (eds).*

Brown, P. and Levinson, S. C. (1987) [1978]. *Politeness. Some Universals in Language Usage*. Studies in Interactional Sociolinguistics 4. Cambridge University Press.

Carletta, J. (1992). *Risk-Taking and Recovery in Task-Oriented Dialogue*. Ph.D thesis, University of Edinburgh.

Fraser, B. (1990). Perspectives on politeness. *Journal of Pragmatics* **14** (2):219-36.

Givón, T. (1989). *Mind, Code and Context*, Essays in Pragmatics. Lawrence Erlbaum Associates, Publishers Hillsdale, New Jersey.

Graesser, A. C and Person, N. K (1994). Question asking during tutoring. In *American Educational Research Journal*, Spring 1994, Vol. 31, No. 1, pages 104-137.

Grice, H P. (1975). Logic and conversation. In P. Cole and J.Morgan (eds). *Syntax and Semantics3: Speech Acts*. Academic, New York, 41-58

Hinton, P R. (1999). *Statistics Explained*. Routledge, London and New York.

Leech, G N., (1983). *Principles of Pragmatics*. Longman, London.

Lehnert, W. (1978). *The Process of Question Answering*. Lawrence Erlbaum Associates, Publishers Hillsdale, New Jersey.

McKendree, J., Stenning, K., Mayes, Y., Lee, J., and Cox, R. (1998). Why observing a dialogue may benefit learning: The vicarious learner. In *Journal of Computer Assisted Learning,* volume 14(2), pages 110-119. Blackwell Science.

Piaget, J. (1985). *The Equilibrium of Cognitive Structures: The Central Problem in Cognitive Development*. Chicago, Illinois: University of Chicago Press.

Penstein- Rosé, C., Di Eugenio, B., and Moore, J. (1999). A dialogue based tutoring system for basic electricity and electronics. *Proceedings of Artificial Intelligence in Education Conference*. Susanne P. Lajoie and Martial Vivet (eds).

Pilkington, R. M. (1999). Analysing educational discourse: The DISCOUNT scheme. Technical report no. 99/2. Computer Based Learning Unit, The University of Leeds.

Porayska-Pomsta, K., Mellish, C., Pain, H. (1999). Why do teachers ask questions? A preliminary investigation. In *Proceedings of the Workshop on Analysing Educational Dialogue Interactions: Towards Models that Support Learning. (AIED'99)*, 53-60.

Porayska-Pomsta, K., Mellish, C., Pain, H. (2000 - to appear). Aspects of Speech Act Categorisation: Towards Generating Teachers' Language. *Special Issue of IJAIED on Analysing Educational Dialogue*

Searle, J. (1979). *Expression and Meaning*. Cambridge University Press.

Sinclair, J. M. and Brazil, D. (1982). *Teacher Talk*. Oxford University Press.

Spencer-Oatey, H D. M. (1992). *Cross-cultural politeness: British and Chinese conceptions of the tutor-student relationship.* Unpublished PhD Thesis, Lancaster University.

Thomas, J. (1995). *Meaning in Interaction*. Longman, London and New York.

Vygotsky, L.S. (1978). *Mind and Society*. Cambridge, Massachusetts: Harvard University Press.

Wojtczuk, K. (1996). *Zachowania jezykowe nauczycieli w sytuacji lekcji szkolnej.* PhD Thesis, University of Siedlce.