Aspects of Speech Act Categorisation: Towards Generating Teachers' Language

Kaska Porayska-Pomsta, Chris Mellish, Helen Pain

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Kaska Porayska-Pomsta, Chris Mellish and Helen Pain *University of Edinburgh, Division of Informatics, ICCS, 80 South Bridge, Edinburgh EH1 1HN, UK.*
E-mail: {kaska,chrism,helen}@dai.ed.ac.uk

Abstract. In this paper we examine a possible method for classifying speech acts produced by human teachers, with a view of informing the designs of intelligent natural language tutors and of providing the basis for a formal analysis of the effects that teachers' language has on students' learning. We argue that traditional means as initiated by the Ordinary Language Philosophers such as Austin (1962), Grice (1975) and Searle (1979) are not sufficient to account for all types of linguistic phenomena occurring in educational dialogues. Two such phenomena are of particular interest to us: (1) speech acts which combine the qualities of several other - less complex - types of speech acts, and (2) the existence of many different speech act forms which can be used by a teacher to fulfil similar communicative functions in identical educational circumstances. We present our analysis of two sets of dialogues which shows that the main difficulty with using the traditional approaches is that they treat speech acts in discrete terms. We argue that categorising speech acts in such a way is not useful in modelling teachers' language in that it does not explain the mechanisms involved in teachers' linguistic choices. Following Givón (1989), we suggest that rather than being classified in a discrete manner, all speech acts should be explained in terms of how close they are with respect to one another on speech act continua derived from an interaction of many different communicative factors. We explain Givón's proposal for an alternative, more flexible, approach and we take the first steps towards extending this approach to account for the linguistic phenomena of interest.

INTRODUCTION

The research presented in this paper is concerned with the analysis of educational dialogues. In particular we investigate the speech acts produced by teachers with the intent of examining the effects that such speech acts may have on students' learning[1]. The language of computer based tutors may be informed by a better understanding of the language produced by human teachers. Such an understanding may be derived from empirical studies of human-human dialogues and from the linguistic analysis and classification of speech acts used. There are many approaches which set ground for such investigations. However we argue that traditional approaches to speech act analysis, as initiated by the Ordinary Language Philosophers such as Austin (1962), Grice (1975) and Searle (1979) are not sufficient to account for all types of linguistic phenomena that occur in educational dialogues. We examine an alternative method for speech act classification (Givón 1989), which we believe might both help to improve the communicative competence of computer tutors as well as it may help to understand the role of speech acts in educational dialogue. In this paper we focus on the analysis of two phenomena which seem particularly problematic for the traditional approaches, but which might be solved by the alternative methods. These are:

- speech acts which combine the qualities of several other - less complex - types of speech acts, and

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[1] That language, including that produced by teachers, affects students cognitive processes is confirmed by the large number of studies concerned with the influence of language use on cognition (e.g. Sinclair and Brazil 1982; Pilkington 1999; McKendree et al. 1998; Cawsey, 1989; Graesser, 1994; as well as studies in cognitive psychology such as Piaget 1985; Vygotsky, 1978; and indirectly Boroditsky, 1999).

- the existence of many different speech act forms which can be used by a teacher to fulfil similar communicative functions in identical educational circumstances.

In education, language is crucial for the success of teaching and learning. Intuitively, not only does it allow the transfer of knowledge from a teaching source (e.g. from a teacher, a book or a peer) to the learner, but also it allows it to be structured appropriately depending on the character of the taught subject matter and the requirements of a given curriculum. In general teachers use language to instruct. Also, they use it to intervene in an incorrect knowledge acquisition on the students' part. In this case they typically use language to lead their students in the right direction by pointing to the possible contradictions and inconsistencies in their reasoning or actions. Thus, teachers use language to perform certain acts and to achieve particular effects on their students. In this sense teachers' linguistic acts conform to the traditional understanding of speech acts as defined by Austin (1962).

However, in educational circumstances, speech acts produced by teachers tend to be much more communicatively premeditated than in other social situations. In educational situations, the possible effects of speech acts on the hearers are typically carefully examined and predicted by the speakers in advance. That this is the case is confirmed by the fact that, during their training, teachers obtain countless instructions which emphasise the importance of preparation of the content to be taught in a given lesson as well of the manner in which to teach it. It is not uncommon to find in such instructions explicit reference to the possible ways in which teachers may express themselves linguistically in order to secure the desired, i.e. the best, results with their students. The fact that teachers are taught explicitly how to use language to achieve their goals has an important implication, namely that there is a link between communicative functions which constitute the driving force and a raison d'être of every speech act, and their possible forms, or the essential elements of their forms. Implicit in this is the assumption that certain words and maybe even constructions are better at achieving some communicative goals than others.

The link between the form and the function of speech acts is particularly relevant to our ultimate goal of modelling teachers' language and its effects on students by means of a Natural Language Generation (NLG) system. It is the generation of the surface form of language that is at the heart of any such system. However, the stance that we are taking is that surface forms are merely tools which when chosen appropriately allow the speakers to achieve intended effects on the listeners. This is why our attention is focused predominantly on analysing language according to the communicative functions, which we believe are the key not only to understanding the mechanisms underlying speakers' linguistic choices, but also to modelling successful communication in general. Modelling teachers' language by means of a NLG system is expected to provide us with a way of evaluating our approach.

The choice of a linguistic form for a communicative function is not a trivial one. This is because:

- several communicative functions may correspond to the same surface form, and

- several different surface forms may correspond to a similar communicative function.

This means that neither the actual mechanisms which underlie teachers' linguistic choices, nor the way in which such phenomena should be accounted for, are immediately obvious.

These two phenomena occur in the real educational dialogues which we have studied to date. The first phenomenon is visible in the form of certain complex speech acts which seem to combine the qualities of several less complex types of speech acts. An example of these is *hidden negatives*, which are used to fulfil many different communicative functions simultaneously. Typically these are the functions of questioning as well as of making a negative assertion. Furthermore, the complexity of hidden negatives is also reflected in the many different surface forms under which they can occur. This fact constitutes the second phenomenon with which we are concerned here. As it will be discussed and exemplified later, there are linguistic situations in which teachers may have to choose from many different ways in which to express propositionally equivalent content and very similar illocutionary forces[2]. As

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[2] 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).

we explain this problem, we also show that an account of this phenomenon does not present itself readily. Thus, rather than presenting a definite example of a valid approach for speech act analysis, what we do is propose one of the possible paths that may lead to identifying a reliable theory of educationally motivated speech acts.

Initially, we concentrate on speech acts which are realised by means of interrogative syntactic forms. However, this does not mean that we are not interested in other types of speech acts, but merely that our current focus is prioritised according to the dominating presence of questioning acts in the dialogues studied.

Several approaches to classifying speech acts produced by teachers have been proposed to date. The most recent of them include the mark-up schemes such as Graesser-Person-Huber (GPH) (Graesser and Person, 1994) and the DISCOUNT scheme (e.g. Pilkington and Parker - Jones, 1996; Pilkington, 1999). These schemes constitute valid approaches to analysing educationally-driven speech acts. They are not dissimilar from one another in the sense that they emphasise the importance not only of syntax and semantics in such an analysis, but also of contextual factors. The DISCOUNT approach relies on the classification of question forms in terms of conceptual categories (or ideational content). These categories are presented in the scheme as rhetorical predicates which are used to link propositions between and inside *Moves*. A Move can be understood here as a speech act, such as for example, Inquire, Challenge, Inform (for a complete list see op. cit.). However, the aims of the DISCOUNT project and those of the work presented in this paper differ. In DISCOUNT the emphasis is on identifying argument structures of educational dialogues in general. In contrast the study discussed here is aimed at investigating the way in which teachers' (complex) goals along with the immediate circumstances affect their choices of individual speech act forms. In that sense our aim has a more narrow scope than is the purpose of the DISCOUNT project.

Graesser and Person (1994) look at questions asked by tutors as well as by students. Their work is particularly relevant to us for two reasons. First, its central focus is on the analysis of questions in tutoring circumstances which is also the focus of our current analysis. Second, it makes an explicit reference to the question generation mechanisms which also constitutes a central aspect of our investigations. The scheme defines some 18 question-content categories based on three criteria: (a) degree of specification, (b) content and (c) question generation mechanism. Furthermore, although the categories are discrete, this categorisation allows for an analysis of certain hybrid questions which combine the qualities of other categories. As such this approach is probably the most closely related to our analysis of teachers' questions. However, it also has its problematic aspects in relation to the issues with which we are concerned. For example, despite the fact that question generation mechanisms are at the centre of the question classification, it is difficult to see how these mechanisms could be used in a useful way to account for the phenomena investigated in this study. This is because it is not clear how their different generation mechanisms affect the choices of speech acts and their individual forms.

Both of the above schemes are sophisticated and elaborated and as such they provide valuable insights to the current investigation. However, it is the elaborated nature of these two schemas that prevented us from using either of them as our starting point. The main worry was that relying on either of them could potentially influence our analysis in ways that would obstruct the view on certain interesting and alternative interpretations of the data. Instead we begin by looking at Sinclair and Brazil's (1982) approach which is an older and simpler view on the nature of teachers' speech acts.

In the following sections we give a detailed account of Sinclair and Brazil's approach. We explain the advantages of using this approach and we illustrate its problems in relation to the linguistic phenomena of interest. We present the data and the methodology which we have used to identify the most prominent linguistic phenomena occurring in the dialogues studied. Furthermore, we discuss our initial approach which remedies the problems of Sinclair and Brazil's approach, but which still fails in more fundamental ways. These problems are inherent to many approaches to speech act categorisation which treat speech acts in discrete terms. We describe one possible approach to speech act categorisation by Givón (1989) which addresses these problems and we make first steps towards explaining how it may be useful for analysing educational dialogue and to the research in Artificial Intelligence in Education in general.

Sinclair and Brazil's Taxonomy

As our starting point we use Sinclair and Brazil's (1982) taxonomy of teachers' speech acts. Sinclair and Brazil's criteria are very useful in providing us with general, preliminary guidelines as to the possible interpretations that one could assign to different questioning acts used by teachers. Their taxonomy provides a systematic overview of the possible correspondences between syntactic structures that teachers use and the effects that such use may have on students. They do that by studying the ways in which teachers' immediate communicative goals are reflected in the language they use. Table 1 illustrates the correspondences that were determined.

Sinclair and Brazil's classification is useful to us in two ways. First, it brings to light some of the pragmatic issues that underlie teachers' language, such as the intended purposes of various constructions and their fit responses. The intended purposes are shown in the Initiation column. Thus it is possible for one to see the correspondence between a linguistic form and their underlying mechanisms. In that sense, it supports our working hypothesis that such matching, and indeed that the finding of regularities in teachers' choices, is possible.

Table 1. Sinclair and Brazil's (1982) classification of teachers' language.

Syntactic Structure	Initiation	Fit Response
Declarative *e.g. Heat isn't sufficient to light a light bulb.*	Informing	Acknowledgement
Interrogative: Positive Polar *e.g. Is heat sufficient to light a light bulb?*	Eliciting: deciding	Decision
Interrogative: Negative Polar *e.g. Isn't heat sufficient to light a light bulb?*	Eliciting: agreement	Agreement
Interrogative: Tag *e.g. Heat is sufficient to light a light bulb, isn't it?*	Eliciting: agreement	Agreement
Interrogative: WH-word *e.g. What is sufficient to light a light bulb?*	Eliciting: content	Content

The second advantage of this approach is that, thanks to its simplicity, and unlike the two schemes discussed earlier, it also makes clear its own inability to capture all of the types of teachers' speech acts. The major limitation from which this approach suffers is that it relies on the syntactic forms as the determinants of the speech act types. One of the examples of the inadequacy of an analysis relying on syntactic form, i.e. of using syntax as a driving force in speech act categorisation, can be seen with respect to positive and negative polarity questions. Such questions often fail to correspond to the types of initiations and the fit responses prescribed in Table 1. Thus, there are situations in which positive polars, instead of eliciting a decision, may elicit agreement, and conversely negative polars, instead of eliciting agreement may seek a decision. We postulate that the difference between those two forms of elicitation is the difference between a question that is intended to test (by eliciting decision) and, for example, a rhetorical one. The latter type is produced for the purpose of rhetoric and as such, if anything, it merely requires agreement. Examples (1) and (2) support these observations. Questions in italics are the polar questions: in (1) the positive polar seeks SPEAKER 1's agreement as to the fact that it is silly to think that heat is sufficient to light a light bulb; in (2) the negative polar seeks a decision. In (2), the TUTOR's reply should be read as *Are you sure that electricity is needed, i.e. heat on its own may be sufficient?*

(1)
> SPEAKER 1: The light bulb got very hot, but it didn't light at all.
>
> SPEAKER 2: It's hardly surprising. *After all, is heat sufficient to light a light bulb?*

(2)
> STUDENT: I think the electricity will light a light bulb.
>
> TUTOR: *Isn't heat sufficient to light it?*

The fact that the same syntactic forms can perform different functions in different contexts is not accounted for by the taxonomy in Table 1. In that sense the taxonomy is unsatisfactory. Furthermore, as our analysis of the dialogues will illustrate, the taxonomy is problematic because it is not geared in any way to account for complex speech acts such as hidden negatives which constitute prominent items of teachers' speech act repertoire. We propose that a large part of the problem from which Sinclair and Brazil's approach—along with a vast proportion of other approaches to speech act classification—suffers, is due to treating the speech act categories as absolute, i.e. as designed to perform one type of function at a time. This means that speech acts such as the hidden negatives (see below) which fulfil several communicative functions simultaneously become *category-less*, if the discrete type of classification is adopted.

THE ANALYSIS OF TEACHERS' QUESTIONING SPEECH ACTS

Data, Methodology and the Linguistic Patterns Found

A series of dialogues was analysed to provide us with a general idea of the types of language used by teachers. We refer to these dialogues as the *Pittsburgh* and the *Polish* dialogues. The Pittsburgh dialogues were gathered for a project entitled *A Computational Model of Tutorial Dialogue* [3] which was carried out at Pittsburgh University. To date, we examined five different interactions, each lasting for approximately one hour, between two different students and a tutor. The dialogue's domain is electric circuitry and their context is simulated laboratories with which students interact. Each interaction in the dialogues corresponds to one or more rules that the student is supposed to learn. The tutor's role is to direct the student, through prompts, towards acquiring these rules (Penstein-Rosé *et al.*, 1999). In addition to the Pittsburgh dialogues, we examined three separate Polish, spoken, classroom dialogues transcribed in (Wojtczuk, 1996). These dialogues were conducted between three different teachers and their respective groups of pupils. Their domain was literary analysis. Each dialogue lasted for approximately forty five minutes

We used no formalised mark-up schema to analyse the two sets of dialogues. The reason for that was that we did not want the patterns of a particular schema to affect our interpretation of the linguistic phenomena that we were observing. Instead, we followed the patterns of occurrence of teachers' particular speech acts. We attempted to differentiate between the speech acts on the basis of students' responses to them as well as with respect to the current point in the lesson, i.e. according to the stage in acquiring a rule at which a student currently found himself. We found that a majority of teachers' linguistic actions consisted of speech acts interrogative in form. These findings are in agreement with current research on teachers' language. For example, one account of Polish teachers' use of language in classroom situations suggests that at least 50% of all types of constructions used by teachers consists of questions (Laskowska, 1989; see also the statistics provided in Graesser and Person, 1994). In both the Pittsburgh and the Polish dialogues, at least 60% to 70% of all teachers' utterances were questions of one sort or another.

We identified the three most frequently occurring types of questions which are presented here under their working names of *straight questions*, *test questions* and *hidden negatives*. The names are intended to reflect our preliminary hypothesis regarding their communicative functions.

In the following two sections we analyse the three types of questioning speech acts that we have identified in the Pittsburgh and in the Polish dialogues. We hypothesise about their communicative functions in the contexts in which they were found. Apart from questions, we also found straight assertions encoded by declarative syntactic forms. However, it seems that both straight questions and straight assertions are scarcely used by teachers in our dialogues. They tend to function as auxiliary acts in that they are used in extreme educational circumstances. These may occur either when clarification of student's previous point, or of his previous response, is requested by a teacher (straight questions), or when a teacher needs to inform the student in a lecturing manner of a point concerned with the subject matter currently taught (assertions). We discuss the three types of questioning speech acts identified, with a primary emphasis of the discussion being on the test questions and the hidden negatives. The latter types are of particular interest to us because they represent complex linguistic phenomena with no clear-cut division that may be made between them. In that sense they constitute data which is especially suitable for illustrating the points that we make subsequently.

Straight Questions and Test Questions

Given that straight questions and test questions may be easily confused with one another—primarily because they tend to have the same syntax—we begin our analysis of test questions by identifying the differences that we believe exist between the two types. As such, both types constitute conventional questions in the common sense of the word in that they imply a degree of ignorance on the part of the speaker (Sadock, 1971). However they differ from one another with respect to the type of ignorance that each of them implies. While straight questions imply ignorance of the actual *subject matter*, i.e. they imply lack of beliefs on the part of the speaker, test questions imply speaker's ignorance of the actual nature of the *beliefs* that the hearer may have.

Thus, a teacher may ask questions such as *What do you mean by this?* or *How do you figure that?* in a situation when she genuinely requires the student to provide her with information about which she has no prior knowledge, or when there is a clear lack of understanding on her part as to the student's responses.

Contrary to straight questions, test questions are not asked out of speaker's ignorance. Unlike participants of typical conversations, teachers already know the answers to the questions they ask. This is one of the underlying facets of educational dialogue. Thus, in a casual conversation the question *Is heat sufficient to light a light bulb?* could be interpreted as a straight question. However in educational dialogue, it could be only interpreted as such if it were produced by a student. If uttered by a teacher, it has only one interpretation—that of a test question. This also shows that the same syntactic encoding may be used to perform different communicative functions in different contexts.

However, as the analysis of test questions reveals, a reverse observation is in order, namely that the same communicative function may be achieved by means of speech acts encoded by many different syntactic forms. Thus, while the example just given represents only one type of test question, i.e. that identified by Sinclair and Brazil (1982) as a positive polarity one, other forms include negative polarity as well as WH-word questions. There are also other syntactic forms of questions that could be used in certain circumstances for the purpose of testing. These include tag questions (e.g. Stockwell et al., 1968): *Electricity is sufficient to light a light bulb, isn't it?* (with the expected type of response being *Yes, it is*), and queclaratives (which are also representative of rhetorical questions mentioned earlier) (Sadock, 1971). An example of such a question would be *Who knows what is sufficient to light a light bulb?* with the expected type of answer being: *Nobody knows.*

The fact that: (a) many different forms may be used to achieve similar communicative goals, and (b) that different goals may be achieved by the same forms, raises an interesting issue of what kind of approach is capable of accounting for the observed phenomena. Clearly an approach such as Sinclair and Brazil's is not a preferred one, because even if it might be

able to account for the former type of phenomenon, it cannot explain the latter. A possibility would be Graesser's (1994) approach which does allow for different forms to be used to express the same force. The problematic aspect of it is that it does not explain how this phenomenon arises. In other words — what is the relation between the different forms and whether or not these forms may have a different impact on the hearer? Accounting for the differences between the forms should provide a clue as to the nature of the linguistic choices that speakers have to make.

Our initial observations of the dialogue patterns allow us to make some claims with regard to the possible communicative purposes of test questions which differ from one another syntactically. First, we hypothesise that the purpose of test questions is to elicit responses from the hearer in order to verify them against some desired answers which are already known to the speaker. In particular, it seems, teachers use such questions to check what and how much the student knows (Quantity of knowledge) and how well he knows it (Quality of knowledge)[4] . Given such direct reference that test questions make to students' beliefs, they also seem to constitute an important means that teachers have for adapting their methods to the needs and abilities of students.

Thus, the choice of a particular form of test question may be related to a teacher's beliefs about the quantity, the quality and the content of a student's knowledge. Our data shows that, while WH-word questions are almost invariably asked to test a student's quantity of knowledge (they elicit content, which is also in accordance with the elicitation type prescribed to this form in Table 1), polarity questions are asked to test the quality of student's knowledge (they elicit decision). However, there are differences in the use of positive and negative polarity questions. Based on our initial data, we postulate that the difference between the two types is the difference in both:

- the underlying conditions that must be satisfied in order to trigger their respective production, and

- the types and the number of communicative goals that they are set to achieve.

At first glance, it seems that positive polarity questions occur in the circumstances where the student has demonstrated relevant, but not necessarily complete, knowledge. For example, the student might know that heat is involved in the lighting of a light bulb but might not show the signs of knowing whether or not it is a sufficient and/or necessary component. Thus a teacher may use a positive polarity question in order to test the associations that the student makes between the properties of the light bulb and of the lighting process and their respective functions. In contrast, negative polarity questions are used to prod students into revisiting their beliefs and re-examining their statements. When negative polarity questions are used they do not necessarily imply that a student has a misconception, but merely that the teacher wants to check whether or not the student's beliefs are strong enough to hold when confronted and/or undermined directly.

Thus, our preliminary analysis of test questions suggests that:
- it is possible to group test questions on the basis of the global communicative goal of testing of students' knowledge, and

- the differences in their surface forms may be attributed to the nuances related to their more specific functions.

Hidden Negatives

Hidden Negatives constitute the second most frequent class of questions in the dialogues studied (between 20% and 30%). Superficially, they could be also classified as test questions, however their underlying goals tend to be more complex than just those of testing a student's state of knowledge. Both examples in (3) belong to the hidden-negative class.

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[4] Carletta (1992) makes similar types of distinctions with respect to different ways in which knowledge may be tested.

(3)
a. Well, think about it this way, if you put a light bulb in the oven, it would certainly be getting a lot of heat but would it be likely to light up?

b. Wires help, but if you hook a wire to a light bulb and nothing else, will it light up?

Even outside their original contexts, questions in (3) seem to have a negative assertive force which is caused by the presence of the polarity items such as *but* and *nothing else*. Furthermore, these items along with the conditional frame IF-THEN, allow for the negative assertion to be hidden within the question, i.e. no explicit negation is used. It is precisely this covert character of their assertiveness that hidden negatives derive their name from. Our interpretation of these forms seems to be confirmed by students' answers to them. If these two examples were treated as conventional questions then the expected responses to both of them would be a yes/no answer. Instead, both questions invite further guesses on the students' part as to the appropriate components of a light bulb that are necessary to light it. The answer given to (3)a is simply *wires*, while that to (3)b is *no, I guess it must be the voltage source*. It is clear in both cases that students understood that the purpose of these questions was to inform them about the incorrectness of their previous answers and to invite them to further responding.

We propose that for a question to be classified as a hidden negative, it has to contain one or more polarity items, i.e. words that signal a contrast between the previous assertion and the current one. These items strongly imply speakers' expectations as to the possible answer. In that sense they actually provide the answer which in the case of questions in (3) can be expressed in terms of propositionally equivalent declarative translations such as:

for **(3)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 it wouldn't (be likely to) light up, and

for **(3)b.** Wires help, but if you hook a wire to a light bulb and nothing else, it won't light up.

The fact that the interrogative forms have their natural declarative near-equivalents is another important characteristic of hidden negatives that distinguishes them from other question forms which can only be expressed declaratively by means of indirect questions.

As we pointed out earlier, polarity items seem always to be present in the hidden negative constructions. They are crucial in determining the strength of the negation. Teachers intensify or lessen the negative force of what they say by choosing the appropriate polarity items and by combining them within a single construction. So (3)a, with only one such item, seems much more positive a question than (3)b, where two items are used and one is an explicit negative noun *nothing else*.   It seems that the more explicit the negativeness of a polarity item and the greater the number of the items in one construction, the stronger the overall negativeness and assertiveness of a hidden negative. But there are also other factors that contribute to this effect. Note, for instance, that there are different verb forms used in the respective questions. While in (3)a a conditional aspect is used which results in a further cushioning of the negation, (3)b uses a present tense which results in its stronger assertiveness.

The dialogues studied imply that the only situations in which hidden negatives are used are when a student reveals that he misunderstood or simply does not know something. This is different from test questions in that the latter tend to be asked either when a teacher has no idea about what and how well the student knows a topic, or as a follow-up to a student's correct response to a previous question. From the purely methodological point of view, we could say that teachers may use hidden negatives and they may vary their assertive force, by means just discussed, depending on the type of misconception they believe that the students have. The general pattern seems to be that if a student's problem is that of general misunderstanding of the issues taught, then a teacher is likely to use a much weaker assertion such as the one in (3)a in order to avoid discouraging or intimidating the student from further learning. On the other hand, if a student's problem is of a more detailed sort, then a stronger negative assertion is likely to be used—(3)b.

Ultimately we can postulate that there are at least three goals that underlie the formation of hidden negatives. First, they are used to indicate to a student that their line of reasoning is not quite right, i.e. that they misunderstood something (informing goal and declarative element). Second, teachers may use such speech acts to avoid discouraging or intimidating the student

from further learning. Straight negations can be pedagogically counter-productive in that, in most cases, they leave no space for the student to explore the issues taught or their own misconceptions. In many cases, to allow students to discover their mistakes for themselves may be better than explicit praise or dismissal on the teacher's part (pedagogical/tactical goal). Finally, the use of such constructions allows teachers to learn more about the seriousness of a student's problems (self-informing goal - the questioning part). If any of the questions in (3) were expressed in terms of their declarative near-equivalents, only one goal would be achieved—that of telling the student that he was wrong.

AN ALTERNATIVE TAXONOMY AND FURTHER PROBLEMS

As we have demonstrated through our analysis of test questions and hidden negatives, syntactically driven classification of such acts does not reflect the linguistic or the pragmatic complexities that seem to play a part in their production. In particular, such an approach does not tell us anything about the reason why teachers as language users make these particular linguistic choices. Furthermore, in case of choices being made on the basis of multiple communicative goals (e.g. with hidden negatives), an attempt to capture these phenomena by means of syntax seems very clumsy indeed. An objection that a supporter of the syntax-based methodology could raise, with respect to hidden negatives, would be that such acts are in fact a result of misplanning on teachers part (e.g. Sinclair and Coulthard, 1975; Sinclair and Brazil 1982). However, given the evidence from the Pittsburgh and the Polish dialogues which shows that such acts are used time and time again within very short discourse distances, it is difficult to attribute their existence simply to teachers' mistakes.

To eliminate the problems from which Sinclair and Brazil's approach suffers, we propose an alternative taxonomy which attempts to gather the observations made with respect to the types of speech acts used by teachers. Our alternative taxonomy is presented in Table 2.

Table 2. Alternative Taxonomy of Teachers' Speech Acts.

	Speech Act Type	Surface Form	Goals	Fit Response
MAIN TYPE 1 ≈ 10%	**Straight Questions**	POLARS	Acquire Information	Yes/No
		WH-	Test Content	Content
MAIN TYPE 2 ≈ 60%	**Test Question**	POLARS	Test Quantity/Quality	Decision
		WH-	Test Content	Content
MAIN TYPE 3 ≈ 25%	**Hidden Negatives**	Contrastive: Polarity Items	1. Information Transfer 2. Hide Negation 3. Test Quantity/Quality	Acknowledgement
ADDITIONAL TYPES ≈ 3%	**Queclaratives**	POLARS	Information Transfer	Agreement
		WH-	Information Transfer	Agreement
	Tags	Is it/isn't it Tag	Information Transfer	Agreement
	Assertion	Declarative	Information Transfer	Acknowledgement

Instead of being classified according to their syntactic forms, the various constructions are analysed in terms of the communicative functions that they perform. In turn, every function is based on clearly specified goals which replace the Initiation column in Sinclair and Brazil's taxonomy. Table 2 incorporates the question types that teachers used in the dialogues studied as

well as the types mentioned by Sinclair and Brazil. The left-most column differentiates between the three main types and other types of questions. It also indicates the approximate occurrence rate of various forms in the dialogues studied. Surface forms which may be used to realise the particular types of speech acts are also included. This shows that the same syntactic forms may perform different communicative functions. For instance, there is a difference between polarity questions that perform a test question function and those that behave like queclaratives (for explanation see section on *Straight Questions and Test Questions*). Furthermore, the taxonomy includes hidden negatives, indicating the three main goals that were listed in the previous section as underlying their production. Also note that the Fit Response column has been adjusted appropriately to reflect the differences between Sinclair and Brazil's, and our own interpretations. Thus, similar to assertions, hidden negatives elicit acknowledgement as their fit response. The reasoning behind this choice of fit response for hidden negatives is that, contrary to agreement, acknowledgement does not need to be expressed by any specific linguistic form. All that acknowledgement needs to produce is any response on the part of the addressee. This type of basic response allows one the flexibility of accounting for the functionally complex nature of hidden negatives.

Evaluation of the Alternative Taxonomy

The taxonomy presented in the previous section solves some of the problems from which the syntactically-driven approaches suffer. It categorises teachers' speech acts into goal-driven bundles and it accounts for complex acts such as hidden negatives. However, this classification also throws light on further aspects involved in the categorisation of these speech acts.

First, despite the fact that we can differentiate between individual, most prominent types of speech acts, we are still facing the problem of having to determine the differences between the acts which form part of the same category. For example, we said that test questions may be encoded by several different syntactic forms and hidden negatives by many different (combinations of) polarity items. All of these different forms can be used to fulfil similar communicative goals in identical circumstances.

Second, even if, as was done in Table 2, a separate class is designed to describe complex speech acts such as hidden negatives, one still is confronted by the problem of how to relate such a class to other categories. As was discussed earlier, hidden negatives contain the traits of more than one discrete category. This means that we need to explain why and exactly in what way they share the characteristics of other classes. We illustrate these points with the example in Figure 1, below. The `*` sign around a word indicates prosodic emphasis, i.e. the stress applied in speech.

Figure 1 shows a particular situation in which many different syntactic forms could be used by a teacher as a response (TEACHER's LEGAL FOLLOW-UP QUESTIONS) to a student's wrong answer to a previous question (CONTEXT). A teacher could potentially choose between any of the forms in Figure 1 which makes the problem of identifying the actual linguistic decisions that teachers have to make to choose one speech act over another particularly complex. While we are satisfied with the coarse distinctions made in the classification in Table 2 in that it differentiates between the most prominent types of speech acts, it is evident that it does not address the issue of what lies in-between these types. For instance, it does not address the question of where the testing function of a hidden negative in example (a), Figure 1, ends and its assertiveness begins. Since all the examples in Figure 1 can be used to address the same problem, i.e. student's misconception or a missing conception, all of these forms appear to have both an element of testing and of asserting. The difference, we may claim, is in the *degree* to which each of those functions plays a role in their production. The respective qualities of the speech acts in Figure 1 vary in terms of their strength. For example we could say that the speech act (a) puts a stronger emphasis on the asserting function, while speech act (e) is more questioning. Unfortunately, this observation still does not solve our problems. In order to model this kind of behaviour, it is necessary to specify what it means for one act to be weaker or stronger in terms of the communicative functions that it is designed to perform. Specifically, at what point can we say that a speech act belongs to one category and not to another one? Essentially, while we can view the forms in Figure 1 as belonging, to various degrees, to the same class of hidden negatives (that is if we treat the emphasis indicated by the stars around a

word as contrastive or having an equivalent value to polarity items), we can equally well claim that they belong, to various degrees, to the class of test questions.

In many respects, interpreting the questions in Figure 1 as being primarily test questions does not make the task any easier. Thus, while we can see a difference between example (a) (typical hidden negative) and example (e) (WH- test question) relatively clearly, what distinguishes (e) and (d) seems much less clear-cut. One could say that the choice of a given form depends on the linguistic style of particular speakers. This is probably true, but only up to a point. Given that there are at least seven different ways in which one may choose to achieve a goal, it is plausible that at least two forms on the list in Figure 1 may belong to any person's repertoire. Thus, we still need to determine the decisions which may be involved in choosing between those. Furthermore, the differences between the acts in the example above may also depend on the focus that a speaker wants to put on a particular component of the propositional content. In this, we are relying on our knowledge of the subject matter represented by such content and of the gains that a speaker may hope to achieve by using a particular speech act and not by another. In turn, the inclusion of the notion of communicative gains requires the speaker to have at least some knowledge of the intricacies of the particular social interaction in which she is taking part. She needs to have some beliefs with respect to the addressee, along with the ability to reason about these beliefs.

CONTEXT:

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

TEACHER's LEGAL FOLLOW-UP QUESTIONS:

a. Well, if you put a light bulb in the oven it will certainly get a lot of heat, but will it be likely to light up?
b. *Does* a light bulb need heat to light up?
c. Is it *heat* that is needed or something else?
d. *Is* heat needed to light a light bulb?
e. *Why* do you think that light bulb needs heat in order to light up?
f. Isn't it something *else* that the light bulb needs to light up?

Figure 1. Possible follow-up questions that a teacher may choose from in identical circumstances.

This poses problems for the solution proposed in Table 2. On the one hand it may be too powerful to address the questions which emerge from considering examples such as the one in Figure 1, in that:

- it attempts to capture the exact categories into which various speech acts could be slotted, i.e. it attempts an absolute classification,

- it does not allow the goals to vary within a category, and

- it does not explain the overlap which is possible between the categories (e.g. the goal of testing shared by test questions and hidden negatives).

On the other hand, the taxonomy in Table 2 may be too weak in the sense that it does not allow one to distinguish in a transparent way between communicative aspects such as social interaction, intentions and style. These aspects may have a possible role to play in the decisions involved in choosing one speech act over another. Thus, it seems that in order to address these problematic aspects, we need to step back from our current position and to dedicate our attention specifically to the question of what sort of linguistic and pragma-linguistic aspects an approach to categorisation might have to include to account for the phenomena outlined thus far. In the following sections we do precisely that. We look at one particular approach to speech act categorisation, namely that of Givón (1989) which we believe may help us identify

and formulate a possible solution to the linguistic problems presented here. Specifically, we concentrate on an approach to dealing with indirect speech acts which we apply the types of speech acts found in the Pittsburgh and the Polish dialogues.

MATTERS OF SPEECH ACT CATEGORISATION — MULTI-DIMENSIONAL COMMUNICATIVE SPACE

The general intuitions about the function of speech acts such as they are expressed by the Ordinary Language Philosophers (e.g. Austin 1962; Grice 1975; Searle 1979) and their later followers are that by means of utterances, whether in spoken or written form, speakers perform actions in order to achieve particular effects on their interlocutors. Generally, these actions constitute the expression of speakers' will and of their ability to affect the world. The effects may be anything from a physical action such as the interlocutor closing a door, to a mental effect such as the interlocutor's changed beliefs about the nature of a particular phenomenon. Interpreting language in terms of speech acts changes the emphasis from studying the truth of propositions independently from the speaker, the hearer and a context, to accepting the speaker's meaning to be the central one (e.g. Clark, 1992; Clark 1996). Speakers' meaning expresses the types of intentions that speakers have towards their conversational partners. On the other hand, word and sentence meaning becomes subordinate to the speaker's meaning, i.e. it can only exist as long as a speaker can mean something by it.

An interesting interpretation of the relation between speaker's and sentence meaning was formulated by Givón (1989). This interpretation suggests that the different meanings which can be ascribed to an utterance are not so much distinct as they represent different communicative factors. Givón calls these factors, rather confusingly and interchangeably, modalities or dimensions. We will continue referring to them simply as factors.

The communicative factors are not autonomous in that the success of a speech act depends on the contribution of, and the interaction between all of the factors. Givón lists five such factors which he claims affect the final form of speech acts:

- **epistemic factors** concerned with graded truth in 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 with respect to epistemic matters, i.e. truth.

- **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** concerned with producing the actual speech act.

Effectively, these factors can be used to express a particular set of circumstances under which a given proposition is believed by the speaker to be able to affect the hearer in an intended way. The intentional factors define what Givón calls the purposive context of a proposition. Thus, by adopting this interpretation, we can say that our taxonomy in Table 2 is based on the differences in the purposive context of different speech acts.

Categorial Peaks and Complex Speech Acts

In Givón's view, the communicative factors interact with one another. This interaction allows one to derive communicative continua on which various speech acts may be defined as graded points. At any time in a conversation the factors have specific values assigned to them. Put together, these values can be used to predict a point on a continuum at which a speech act occurs. Each such continuum contains prototypical speech acts — also referred to as prototypical peaks. Such peaks represent the most prominent types of speech acts in a given language. The prominence of a speech act type is measured by observing how often it occurs with the same illocutionary force in a given language (e.g. cross-linguistic studies such as

Sadock and Zwicky 1985 as cited by Givón). Categorial peaks constitute linguistic landmarks between which lies 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 on the basis of how close or how far it is to a given peak. The characteristics of a speech act also depend on what other peaks are in its proximity.

Givón's proposal can be illustrated by the example of indirect speech acts such as *Can you pass the salt?* which may be said to fall somewhere between the two prototype peaks of imperativeness and interrogativeness (Figure 2). The actual position of every speech act is determined by the values of the communicative factors involved.

In contrast to the prototypical peak interpretation, traditional approaches treat indirect speech acts as linguistic scavengers which feed on other, less complex speech act types without actually belonging to any particular class of their own. Indirect speech acts have been described as performing a communicative purpose of one type under the guise of another one. However, this kind of interpretation is neither particularly believable nor is it supported by cross-linguistic evidence.

The interpretation is not believable in two ways. First, it does not explain why a speech act would have to *pretend* to be something that it was not. What is more, the pretending element seems to defy some of the basic principles of successful communication such as the Principle of Parsimony (e.g. Carletta, 1992), which suggests that on the whole speakers put as little effort into language production as is possible. Producing an act that masquerades as one type, while having the communicative function of another, must be quite costly on the speaker as well as the hearer whose task it is to decode it. Second, the traditional interpretations do not explain whether or not the complex speech acts can use the characteristics of all the non-complex speech acts or whether there are any restrictions imposed on such use. In other words, there is no explanation of the sorts of relations that may exist between different non-complex acts which somehow form part of the complex ones such as the indirect speech acts. When one places complex speech acts on the continua as in Figure 2, the prototypical peaks approach might allow one to address this issue.
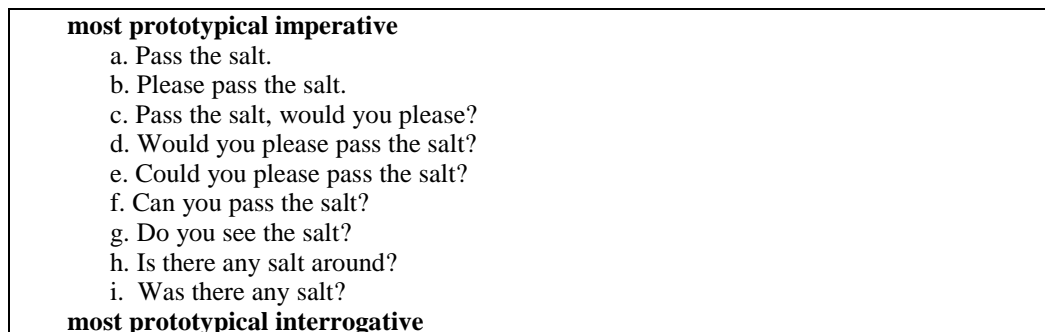
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most prototypical imperative
    a. Pass the salt.
    b. Please pass the salt.
    c. Pass the salt, would you please?
    d. Would you please pass the salt?
    e. Could you please pass the salt?
    f. Can you pass the salt?
    g. Do you see the 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).

Furthermore, the interpretation of indirect speech acts proposed by the traditional approaches is not supported by cross-linguistic evidence. Givón observes that one of the problems with such approaches is that they ignore the high frequency with which indirect speech acts occur cross-linguistically. For instance studies such as that by Brown and Levinson (1978, 1989) show that indirect speech acts are used systematically and consistently 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 (see cross-linguistic studies, e.g. Sadock and Zwicky 1985 as cited by Givón) also suggests that they represent much less clear-cut phenomena than the discrete type of categorisation permits one to reveal. Givón's prototypical peaks and the speech act continua as in Figure 2, allow one to acknowledge and to address the non-discrete nature of certain linguistic phenomena.

Does this Interpretation Fit the Bill

Givón's proposal brings us back to the question posed earlier regarding the point at which in hidden negatives one could say that the qualities of one act ended and that of another one began. His interpretation suggests that no such point can be identified and that, rather than belonging to discrete categories, the distinctions between speech acts are a matter of degree (as illustrated in Figure 2). In effect, this means that there are no discrete speech act categories as such. Instead the distinctions that one can make between certain speech acts are due simply to the frequency of their cross-linguistic occurrence. Thus hidden negatives could be characterised in a similar way to the 'classic' indirect speech acts. The difference would be that instead of 'masquerading' as one type while performing the function of another one, hidden negatives fulfil the functions of all the types involved. So, typically these acts are encoded by the interrogative syntactic form, but the function that they perform is that of both eliciting and of imparting information. Inspired by Givón's interpretation, we can postulate that, instead of representing the qualities of the negative-assertive and the questioning speech acts, hidden negatives constitute speech acts in their own right. The fact that they seem to share some of the qualities of the other acts is due to that they occur somewhere in between them on a speech act continuum similar to the one presented in Figure 2. Furthermore, we could say that whether an instance of a hidden negative seems more assertive than another instance depends on what prototypical peaks that are in their proximity, and on their distance from the peaks.

Previously we also observed that in order for a hidden negative to be identified as such, it ought to contain one or more polarity items. We suggested that, depending on a type and a number of polarity items used in a single hidden negative, the negating quality of it may vary in strength. Essentially, what this implies is that in order to determine the likelihood of a hidden negative being used in a given set of circumstances, we need to determine the variance in the strength of the polarity items themselves. In turn, note that the notion of strength necessarily implies gradation of some sort. For instance, the fact that we can refer to certain phenomena as being stronger or weaker with respect to one another suggests a continuum on which these properties occur, with their diminishing (or increasing) qualities appearing in between. Therefore, if we are correct in our intuitions about hidden negatives as differing from one another in a graded way, then it seems that the differences between the instances of this class of speech acts may be also explained using the speech act continuum approach.

Similar analysis is possible in the case of the follow-up questions to a student's incorrect answer presented earlier (Figure 1). The follow-up questions are listed in Figure 1 in an arbitrary way. The continuum approach of Figure 2, enables us to characterise the speech acts in Figure 1 in terms of degree of similarity between them. For instance, if the speech act at the top of the list is an example of the most prototypical hidden negative, then we can say that the speech acts listed below it are more or less different from it. Of course, such distinction making also requires us to make decisions with respect to what may constitute prototypical speech acts in such a continuum. We can do this, for example, by analysing the frequency with which each instance in Figure 1 occurs in real dialogues. The speech acts which appear most frequently could be treated as prototypical. Furthermore, in order to determine the similarities between the speech acts in Figure 1, graded orderings between them should be adopted. This could be done through experiments which would test, for example, the appropriateness of a particular speech act in given contexts. The contexts could be defined on the basis of the communicative factors, as discussed by Givón, and their different values. The values would indicate the graded nature of the factors used and ultimately could serve as an indication of the similarities and differences between speech acts motivated by their presence.

Gaps in Givón's Model

Unfortunately, although potentially extremely useful for an analysis of educational dialogues, Givón's approach has also its troublesome aspects. It is not immediately clear, for instance, what may be the link between his epistemic factors and teaching methodologies, which we would like to think play a part in teachers' choices of speech acts. What seems to be missing from his explanations is the role that all of the factors mentioned by him play in speech act formation. Givón dedicates a lot of attention to redefining the epistemic factors in terms of the

corresponding grades in speaker's subjective certainty and he outlines the possible types of assertions along with their typical syntactic forms which correspond to different degrees of speaker's subjective certainty. This is illustrated in Table 3.

Necessary truth may be expressed in presuppositional terms because it assumes shared backgrounded information between the speaker and her interlocutor and, as such, it does not tend to be open to challenge. The *realis*, i.e. *strong*, assertions, require speakers to be prepared to defend their propositions. The *irrealis*, i.e. *weakly* asserted, speech acts are not only open to challenge, but speakers often use them specifically for the purpose of exposing the information expressed by them to correction and corroboration (Givón 1989, p.137). Finally, non-truth is expressed typically by negative-assertive acts.

However, although Givón's observations presented in Table 3 are very useful, strangely, they do not take into account the other communicative factors that he proposes. It is not at all obvious in what manner exactly they may affect the final forms of a speech act produced. The reliance on the subjective certainty of a speaker as the only factor influencing her linguistic choices somewhat weakens Givón's account. For instance, in an educational situation, while a teacher may choose to use a strong assertion based on her being sure that, say, the student's latest contribution was wrong, 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.

Table 3. Correspondences between Givón's epistemic factors and subjective certainty factors along with the syntactic encodings of speech acts triggered by the factors.

Epistemic Factors	Speaker's Subjective Certainty Level	Corresponding Type of Assertion	Syntactic Encoding
Necessary Truth	Very High	Expressed in presuppositional terms	Declarative containing definite NPs.
Factual Truth	High	Realis, i.e. strong	Main declarative, affirmative clauses with past perfective aspect.
Possible Truth	Low	Irrealis, i.e. weak	Non-declarative containing future tense, IF clauses, epistemic adverbs (e.g. maybe, presumably).
Non-Truth	High	Expressed by negative assertive acts	Declarative constructions

Givón does not provide any means by which to assess the interaction (nor the effect of that interaction) between the communicative factors. Specifically, he does not suggest any method for measuring the changes in the values of different factors or for measuring the effects that the changes in the values of one factor may have on the values of other factors. In many respects, Givón's approach seems rather vague and as such is left in the sphere of speculations and untested intuitions. Thus, in order for his model to be useful to us, it is necessary to test its many aspects, especially the ones concerned with the factors that play a role in speakers' linguistic decisions. The effect of each set of factors along with their values on speaker's linguistic choices also needs to be determined.

Taking the Methodology Forward

Based on the discussion so far, there are many issues which need to be addressed in order for our model of educationally driven communication to be in any way reliable. The questions that require our immediate attention include identifying the communicative factors which may play a role in teachers' linguistic decisions, and correlating these factors with the actual speech act types and forms produced. To this end we plan to design and to run several empirical studies which will rely on the judgements of human teachers with minimum of two years experience.

Inspired by Givón's proposal, there are two questions that we would like to address in the immediate studies:

a.   What communicative factors are most prominent in certain educational contexts?

b.   What types and forms of speech acts correspond to which factors?

We believe that by answering these two questions and by putting the answers together, we will be able to identify the factors immediately responsible for triggering the production of certain speech acts. In turn, this information can be used both to build an intelligent natural language tutor which is informed by the studies of real language, and further, it can serve as a basis for a formal analysis of the effects of the language used by teachers on student's learning.

Givón gives us clues as to what factors we may want to consider. For example, he suggests that the following three factors may have to be considered for the speech acts in Figure 2:

- the power (authority or status) gradient between speaker and hearer (social interaction factors),

- the speaker's ignorance concerning a state of affairs about which he wishes to learn (epistemic factors), and

- the degree of speaker's sense of urgency or determination vis-á-vis the attempted manipulation (intentional factors to which Givón sometimes also refers to as manipulative ones).

Thus, the move towards a more interrogative form on the continuum in Figure 2 could be interpreted, for instance, as the expression of speaker's low subjective certainty with respect to whether or not there was any salt available. But other interpretations are also possible. For example, in certain circumstances, the choice of a more interrogative form on the speaker's part may depend on her power or status in relation to other persons present. Her status may be low and therefore, if the particular social norms prescribe it, she may be expected to be extremely polite and indirect. In such situations she may choose to use a less assertive types of speech acts. On the other hand, her status may be higher than that of other persons and she may use a more assertive way of communicating.

Many interesting cross-cultural studies (e.g. Brown and Levinson, 1979 and 1989; Tsuchihashi, 1983; Syder and Pawley, 1974; Spencer-Oatey 1992) provide us with a rich source of information with respect to the effects that socio-personal factors have on language production. For example, specifically in relation to the choice available in Figure 2 and the three factors above, these studies suggest that in many cultures people with lesser authority tend to use linguistic hedges when making assertions. Such hedges would cause speakers' speech acts to have more interrogative forms. On the other hand, more authoritative members of a given society tend to use stronger means of expressing their opinions—the imperative end of the continuum in Figure 2. Furthermore, Tsuchihashi (1983) points out that in many cultures people may choose to *play-down* their subjective certainty out of politeness or due to the lower status assigned to them by the society in which they find themselves, e.g. women in the Japanese culture.

This socio-anthropological evidence can be easily applied to the educational context. If we used Givón's three factors above, we could say that sometimes teachers may want to *play-down* their status in order to awake in students greater confidence and readiness to contribute to the interaction. In fact, we have speculated already that this may be one of the goals underlying hidden negatives. So, instead of bluntly using a negative assertion, a teacher wraps it up in a question, i.e. Givón's irrealis (weak) type of assertion, in order not to discourage the student from participating in the dialogue and from further learning. However, whether or not power is

indeed an important factor, or that it is a factor at all in teachers' linguistic choices, remains to be tested. In fact it seems unlikely that it would be the only or the most important factor involved, simply because educational circumstances are different from other social interactions. Power games may be less common in such interactions, because the status of the participants is clearly defined by the situation. Other factors, such as the teachers' beliefs about the student's aptitude, his confidence level or the difficulty of the current topic, seem more crucial to teaching and are expected to affect teachers' linguistic choices to a far greater extent. A close look both at various educational circumstances as well as at the social studies are essential to a successful identification of the factors which influence teachers' language production.

Once the communicative factors are identified, the next stage of our immediate research involves finding the correspondences between these factors, and the types and forms of speech acts found in the dialogues studied. Once again, possible clues about what this task may involve come from socio-linguistic research (e.g. Leech, 1983; Brown and Levinson 1978, 1987; Spencer-Oatey, 1992). An aspect of this research that is particularly relevant to us is the link that is made between politeness and varying forms of speech acts, as well as the importance that it assigns to context.

We envisage this in the following way. After a set of factors is identified, it can be used to construct descriptions of specific educational situations. For example, if the set of factors such as *immediate educational goal*, *difficulty of the current topic* and *student's confidence level* were part of the set, we could assign specific values to them and construct a situation description such as: *Your immediate goal is to teach your student about the essential components of a light bulb. This topic is not very difficult, but the student does not appear to be very confident about it.* Such situation descriptions, along with sets of speech acts, would be given to the participants of our study who would be asked to scale the speech acts according to their appropriateness in a given situation. This kind of study is expected to provide a way of mapping not only between speech act forms presented and the communicative factors, but also between the speech acts and the concrete values assigned to the factors. Ultimately it is expected to provide a solid, empirical basis for further analysis and formalisation of the phenomena discussed in this paper.

CONCLUSION

In this paper we investigated the issue of what may constitute a valid and a reliable method of identifying and of classifying teachers' speech acts. Within that, the main goal was to set ground for a study of the choices that teachers have to make with respect to different ways of expressing similar communicative goals. We have demonstrated that the fact that there are different ways in which to communicate similar information presents a challenge to many existing approaches to speech act categorisation in that they treat speech act categories in absolute terms. We have shown that syntactically driven classification such as the one used by Sinclair and Brazil cannot account for the phenomena encountered in the dialogues studied in that:

a. it cannot incorporate hidden negatives, since such speech acts are not expressed by any one particular syntactic form, and

b. it cannot express the fact that syntactically identical speech acts such as negative and positive polarity questions may be used to perform different communicative goals.

We presented an alternative way of classifying speech acts, through which we also addressed the two points listed above. However, we have shown that the alternative taxonomy raised further questions with respect to other linguistic issues for which it alone could not account. These issues are central to our research concerns—namely to identify and to model the decisions which contribute to teachers' linguistic choices. We concluded that, in order to be reliable, a method of classifying teachers' speech acts needs to be able to deal with the fact that often speech acts which are syntactically identical are used to fulfil different communicative goals and, what is more, that different speech act forms may be used to fulfil similar communicative goals.

As the first step towards providing an account of the linguistic issues discussed, we propose to consider Givón's approach to speech act categorisation which is based on the idea of a multi-dimensional communicative space. We have attempted an explanation of the linguistic phenomena at hand in terms of Givón's approach, showing that it may be a good methodology to apply to our set of research problems. Finally, we have sketched out some possible extensions to Givón's approach that may be necessary to account fully for these problems. In particular we pointed out that in order for the ideas expressed in his approach to be useful for modelling teachers' language, it is necessary to identify the communicative factors which play a role in educational dialogues. It is also necessary to correlate these factors with the actual speech act types and forms used by teachers. We propose to carry out these two tasks by means of empirical studies which will also address our hypothesis with respect to the speech acts identified in the two sets of dialogues studied.

The value of pursuing Givón's approach to Artificial Intelligence in Education is two-fold. First, it is expected to provide Intelligent Tutoring System (ITS) builders with solid, empirical data relating to the language used by human teachers. We believe that such data should be the basis of any ITS using dynamically generated, i.e. not canned, natural language dialogue. This includes research concerned with representing dialogues amongst agents which seems to rely largely on the traditional approaches to speech act categorisation (e.g. Cerri, 1996; Paiva, 1996) and the research which uses dialogue models for other related improvements of AI systems (e.g. McCarthy, 1992). Second, we believe that the data obtained from such studies could be used to research the effects of language used by tutors on students' learning. In turn, this should prove valuable not only to designing better natural language dialogue tutoring systems, but also in improving student modelling modules for such systems. As part of our future research we plan to concentrate on these issues further, ultimately expecting it to lead us to a point at which they can be formalised in a natural language generation system. We expect such a speech act generation system to serve as an tool for evaluating our model of educationally driven communication. Such a system might later provide the communicative component of a tutoring system.

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