Pragmatics 9:4.535-565 (1999) International Pragmatics Association DOI: 10.1075/prag.9.4.06ben

THE ORGANISATION OF KNOWLEDGE IN BRITISH UNIVERSITY TUTORIAL DISCOURSE: ISSUES, PEDAGOGIC DISCOURSE STRATEGIES AND DISCIPLINARY IDENTITY

Bethan Benwell

1. Introduction

This paper represents an attempt to describe the development and structuring of information and knowledge in two university tutorials. Research into topic or information structuring in texts has to date tended to be confined to written texts. In this paper I argue that spoken tutorial discourse can be described in terms of topic or information hierarchies which are linked via a finite series of rhetorical relations; these I have termed "Pedagogic Discourse Strategies". Such strategies appear to be a function of both the subject matter of the tutorial and the pedagogic methods employed. The preliminary analysis of a small sample of tutorial data suggests that it is possible to identify the macro structuring of information in spoken discourse, but that the dynamic and extempore nature of tutorials makes this a more complex issue than information structure analysis of written or prepared texts. Tutorial discourse will, however, lend itself more easily to a macro-structural analysis compared to casual conversation by virtue of its "agenda-ed" nature. In addition, the paper considers whether there is a specific link between the epistemology and methodology of a subject and the patterns of discourse strategies found in tutorials in the subject area.

The aims of this paper are three-fold: Firstly to explore a model of knowledge structuring in spoken tutorial interaction; secondly to provide a formal description of how knowledge is structured in two contrastive subject tutorials (science and arts); and thirdly, to describe how this relates in predictable ways to subject methodology.

The paper sets out a model for describing *Pedagogic Discourse Strategies*: Moves of discourse and patterns of moves of discourse which construct or facilitate types of knowledge, (these will be described in due course).¹ I predicted that an analysis of such features would greatly illuminate the characteristics of and distinctions between tutorial sub-genres (e.g. revision tutorials; science tutorials), although not until such an analysis is combined with a description of social variables and metadiscourse can a description of the tutorial as a genre be said to have been achieved. The social dimension of the tutorial is discussed elsewhere (Benwell 1996) and it should be stressed that the two dimensions of teaching discourse: Social and cognitive, need ideally to be considered in conjunction for

¹ The term *discourse strategy* or *strategy* has been used by a number of other linguists, for instance House-Edmonson (1982), Testa (1991), De Capua & Dunham (1993) and Lakoff & Tannen (1984) particularly in a pragmatic context. However my own use of the term is unique and oriented to specifically pedagogic knowledge structuring.

a full understanding of what is meant by pedagogy,² but in this paper I will be focusing on developing a description of the linguistic processes of knowledge development and transfer.

In what follows I shall describe the background of the genre by providing a brief overview of the university tutorial and the subject identities and methodologies of the two subjects under scrutiny. I will then go on to summarise research already undertaken by others to describe knowledge/information structuring in texts and explain why I believe a new model needs to be formulated for application to spoken tutorial discourse, (i.e. a genrespecific model). The model of *issues* and their hierarchical organisation followed by relations between *issues*, (*pedagogic discourse strategies*) will then be outlined and applied to two contrastive samples of data; one from a Physics tutorial and one from an English literature tutorial. Finally the results of the rhetorical analysis will be discussed in conjunction with a consideration of subject methodology, to see to what extent current practice reflects current epistemological paradigms.

1.1. The university tutorial

The British tutorial is generally conceived to be an intimate and fairly informal forum for expressing and developing ideas. It usually involves a small group of students³ and is led or facilitated by a tutor. Its function varies considerably across different disciplines, but is usually understood to shadow and supplement lecture material on the course, exploring ideas and ensuring understanding of material previously covered. Whilst the function in the sciences is less open-ended and discursive, there is still a sense in which the student proceeds by self-discovery, rather than passively internalising instruction. This is why a model of *collaborative* knowledge structuring will be so crucial to this paper. The tutor is guide, mentor and expert and the student forms a type of apprentice relationship with them, where the method and skills needed to arrive at reasonable conclusions are taught, rather than the unchallenged content of these reasonable conclusions. The tutorial in British Universities is a highly respected mode of pedagogy, whose form is increasingly under threat from growing student numbers and diminishing resources. One aim of this paper is therefore to promote awareness about the form of the tutorial and the importance of its study.

The sample of data used for this study is small and therefore not generalisable, but is used as a starting point from which to develop and test a model of discourse. The two tutorial extracts are taken from small group, teacher-fronted classes in Physics and English from two separate institutions in Britain. The English extract represents a discussion, whilst the Physics extract is more of a problem-solving session.

² A useful distinction between the two dimensions is that the former almost always refers to the strategies and moves of the tutor, by virtue of his or her role, whilst the latter is a shared resource between participants in a learning or discussing environment.

³ Numbers of students in the small group tutorial range from about three to twelve. The tutorial in Cambridge and Oxford is still frequently a one-to-one session between student and tutor, but this model is not being explored in this paper.

1.2. Disciplinary identity and methodology

In *Academic Tribes and Territories* (1989) Becher addresses the question of what defines and distinguishes academic disciplines in considerable depth and detail. He suggests that disciplines are not stable entities, but that they differ across time and space. He also claims that, despite these contextual variations, they will have recognizable identities and cultural attributes.

We are used to hearing discipline differences described in terms of binary oppositions: "hard vs. soft", "pure vs. applied", "atomistic vs. holistic". Hard and soft distinctions tend to refer to the extent, scope and unanimity of theory, but also to the perceived objectivity of a discipline: The extent to which phenomena may be observed and results and experiments replicated and verified. The two disciplines under scrutiny (Physics and English Literature) represent points at either end of the "hard-soft" spectrum and thus are usefully contrastive in terms of methodology and knowledge structuring.

Physics is the most fundamental of all the natural sciences and explains phenomena universal to the description of all physical entities. If the "core" of a subject is best defined by its goals, then Physics aims to reduce the description and explanation of natural phenomena to as few universal laws as possible. Becher also describes Physics as "atomistic", the notion that it is a discipline which proceeds by the accretion of smaller pieces of knowledge to make a larger whole. Modern scientific method is most closely associated with induction, the means of establishing universal laws by a process of extensive and repeated observation under controlled conditions and usually combined with an intuitive hypothesis. In fact Rogers (1993) points out that despite the prevalent view that the induction method governs modern science, modern practice, especially in more abstract sciences like Physics, is more akin to *deduction* whereby laws and theories are deduced by leaps of faith and inspiration and the logical process of mathematics and then laid open to challenge by the process of *falsification* (cf. Popper 1974). The processes governing the sample from the Physics tutorial, although clearly the revision of *known* formulae, will be shown to follow largely this deductive method.

English Literature, whilst in essence being the critical study of literary texts, is notable for the fluctuating and divided opinion concerning its aims and methodologies, which has led some critics to suggest that it is a subject "in crisis", unable to defend its academic rationale (e.g. Guy and Small 1991). Eagleton (1983) claims that the discourse used to talk about literary texts is more important than the content of the texts themselves, and that this discourse is rightly plural and "theoretically limitless" (p.201). The development of theories such as *Post-structuralism* and *New Historicism* has challenged earlier assumptions about the relationship of critic to text and attempts to draw out the underlying ideologies behind value judgements. The open-ended, plural and unstable nature of post-structuralist approaches makes the study of English both exciting and difficult to pin down as replicable methodology. Some of the implications and practical resonances of this "crisis" will be demonstrated in the analysis of the English data.

1.3 Towards a text-structure analysis of interactive discourse

Discourse analysis of interactive speech has tended to focus upon social or pragmatic function. Many analysts of casual conversation expressly avoid the ideational function of talk since it is largely irrelevant within casual contexts, (e.g. Eggins and Slade 1997: 49-50). Tutorial discourse is unlike casual conversation by virtue of its predominantly ideational (as opposed to interpersonal or social) function. Moreover, formal teaching situations, unlike casual conversations, are more likely to represent their propositions in terms of surface realisation, making a propositional analysis more plausible.

Structural analyses of spoken dialogic discourse tend to have been confined to exchanges rather than global semantic organisation, yet it is striking that the continually reiterated principle of "binary connections" in textlinguistics - "meaning between two coherent stretches of text" (Jordan 1992: 179) bears strong similarities to the principle of adjacency pairing (Sacks & Schegloff 1973) and exchange sequences (Sinclair and Coulthard 1975). Similarly, Keenan and Schieffelin (1976) describe the *discourse topic*: A single proposition, but one which may be a single utterance or may be extended over an exchange or even a sequence of exchanges. Acknowledging that a proposition is constructed between more than one speaker contributes greatly to my own sense of the collaborative nature of knowledge construction in tutorials and suggests that any model of knowledge or information stucturing in a *spoken* text will need to incorporate provision for the joint construction of knowledge or information between two or more speakers.

Approaches to global topic or information structure are offered variously within *textlinguistics* and *discourse semantics*. These tend to have focused upon written prose only⁴ and embrace a number of approaches which are closely related but not entirely reconciled. In this field, research can be allocated into a number of categories: Halliday's school of text linguistics which tends to concentrate upon the micro relations between and within clauses, or *cohesive ties* (e.g. Halliday and Hasan 1976, 1989), Winter and Hoey's theory of *Clause Relations* focusing on surface structure relations between stretches of text (e.g. Winter 1982; Hoey 1983), the "conceptual", top down approach represented by de Beaugrande and Dressler (1981) and van Dijk/van Dijk and Kintsch (e.g. 1977, 1983, 1985) and the American *Rhetorical Structure Theory (RST)* of Mann and Thompson (e.g. Mann and Thompson 1985, 1986 and 1992).

Terms used to describe the global organisation of topic or information include: Macrostructures (van Dijk 1997), schemata (van Dijk 1997) and text representation (van Dijk and Kintsch 1978). Most of the approaches describe the organisation of *propositions*: "...abstract representations of meaning, which ignore grammatical and lexical form" (Stubbs 1983: 203). Van Dijk's work also incorporates a description of the actual cognitive processing of the text, both in terms of text production and reception and overlaps considerably with psychological/artificial intelligence approaches to language.

A proposition-based analysis of discourse organisation and meaning is not without its critics. Brown and Yule (1983) point out that the isolation of propositions (since they are not identifiable through surface form) is ultimately a subjective interpretation. Subjective interpretation is a problem common to text structure analysis and acknowledged

⁴ Halliday's clause complex relations analyses of spoken monologue are an exception, e.g. in Halliday (1985).

by Mann and Thompson (1992) about RST :

The role of **subjective judgement** in the theory should be made clear. ...If a linguistic theory of text structure is to be functional, judgments about the functions of texts and text parts must be made in the process of creating and testing the theory. In practice, such judgments are necessarily subjective, since they are made only by human beings who communicate, on the basis of what they know about their culture, their society and their language. (p.52)

In my own analysis I too acknowledge the subjective judgement brought to the process of classification.

A great many of the researchers exploring information structure reach the same conclusion that discourse can be usefully segmented into hierarchical structures. Mann and Thompson and their contributors (1992), for instance, propose that texts are invariably hierarchically ordered at a series of usually three levels. The highest level corresponds to the whole text, the middle spans groups of clauses or sentences, and the lowest level describes syntactic structure below or between clauses. Winter (1994) defines two levels of structure; one at a higher level he terms *Basic Text Structures* (such as Situation-Evaluation; Hypothetical-Real), usually realised over global stretches of discourse, and the other *Basic Clause Relations*, divided into *Matching Relations* (either comparative or contrastive) and *Logical Sequence Relations*.

Research into information structure also attempts to describe relations *between* units of discourse. Mann and Thompson set out a long but potentially finite typology of relational propositions (1986 and 1992) which they claim hold between semantically defined portions of text. They also identify the binary but asymmetric relationship between *nucleus* and *satellite* text spans. Nucleus text spans are the "locus of effect" (1992: 48) and satellites are supportive of these. An example might be *claim* (nucleus) and *evidence* (satellite).

Mann and Thompson's criteria for identifying relational propositions are necessarily subjective and intuitive, but Winter describes three "vocabularies" which serve to identify clause relations. These are, firstly, subordinators or coordinators linking clauses within a sentence; secondly, conjuncts; and thirdly, lexical items which paraphrase the meanings of the above (e.g. "relates", "the consequence")⁵. Again, it is necessary to stress that such relations are not always explicitly signalled.

But can any of these insights into propositional structure be brought to bear on spoken discourse, and in particular, the university tutorial? Mann and Thompson comment upon the absence of research which has attempted to apply these theories to spoken texts: "RST has not yet been effectively related to dialogue." (Mann, Matthiessen and Thompson 1992: 68)

Martin (1992) in fact suggests that RST is inadequate as a representation of conjunctive structure for dynamic, particularly spoken texts, (Martin 1992: 258, 262-264).

⁵ See Winter (1982). Jordan (1984) also offers useful lists of these.

1.4. The need for a new model

For the purposes of analysing information structuring in tutorials, I have chosen RST as a *starting point* on which to base my framework. Not only does it address the hierarchical structuring of propositions (or "text spans"), it also provides comprehensive descriptions of all possible rhetorical relations *between* propositions. However, the genre-specificity of tutorial discourse led me to adapt a slightly different version. Firstly, as Mann and Thompson acknowledge, RST has not been successfully applied to spoken interaction. They stress that RST lends itself most successfully to *coherent* texts (Mann, Matthiesson and Thompson 1992) which spoken interaction frequently is not. Any model of information structuring in spoken interaction must have provision for the description of repetition, and for the infinite embedding caused by clarification or repair.

Tutorial discourse also has an obvious pedagogic function which means that types of relations between propositions may be more appropriately described within a context of knowledge growth and cognitive development. Consider, for instance, the utterance by a physics tutor from my data: *If we work out modZ then we'll be able to get the current we require.* In RST this would presumably be described as a *conditional* relation. However, this does not really encapsulate the pedagogic function of such an utterance of enabling cognitive progression, thus prompting the need for a different set of terms. The typology of such relations is outlined below, and clear similarities will be apparent between this and Mann and Thompson's categories.

The next section and the outlining of the Framework (Fig 1) in particular aim to bring some of the important principles of text analysis outlined above to bear upon my own description of the organisation of information in short tutorial extracts.

2. The frameworks

2.1. Towards a topical organisation of the tutorial: Issues

The model explicated here is inductively derived from the study of a corpus of tutorial data and aims to describe propositional units of information or knowledge, which, from a close examination of the data, appeared to have a more autonomous existence within the text. "Autonomous" is a term used by Sinclair (1983) in useful opposition to "interactive" to convey the distinction between the dimension of discourse which links texts to participants, and the one that describes emergent text processes:

..the autonomous plane shows the product of discourse, the shared meaning; the interactive plane shows the process, the means whereby the meaning is made available for sharing. (p.87)

Since the process of structuring and conveying knowledge is still a dynamic one governed by participants, the term "autonomous" is possibly misleading, but attempts to draw attention to the more propositional, retrospective structures present in a formal teaching situation.

In order to describe units of knowledge or information in the tutorial, I shall use the term, *Issue*. Issues are defined conceptually, and bear obvious similarities to the contested

term, *topic* but are distinguished by the notion of an agenda governing their parameters, as well as by a principle of embedding; issues contribute to larger issues. In tutorial discourse, they have a tendency (at least at a lower level, and in traditional, close-ended teaching) to correspond structurally to tri-partite teaching exchanges (Sinclair and Coulthard 1975), e.g.:

T: ...if you want a current IRMS for example and you know the IRMS, what's the thing that relates the two together?
 S: Magnitude of Z
 T: The magnitude of Z; Good
 (Issue across an exchange)

However, issues may also be confined to a single turn, if they represent a conceptual shift from the previous turn, e.g.:

(2) S: I found that if I didn't understand it I just got frustrated rather than laugh (Issue within one turn)

Issues also correspond closely to the definition of "discourse topic" as outlined by Keenan and Schieffelin (1976), and to the definition of "proposition" within formal linguistics. Again it should also be made clear at this stage that whilst *issues* will be described in terms of hierarchical organisations, in *textlinguistic terms* (those outlined in section 1.3), we are actually dealing only at the *middle* layer of text structure (*macro-propositional:* Meyer 1992; *macrosegmentation:* Longacre 1992; *relational structure* Mann et al 1992; *episodic:* Tomlin et al 1997).

The *issue* is defined and governed by *agenda*: A combination of speaker agenda and a more abstract knowledge agenda. In most tutorials, particularly traditional ones, the speaker whose agenda governs the content, global organisation and scope of the issues will be the tutor. Need for clarification by students may to some extent determine the lower level organisation of issues.

2.2. The hierarchical structuring of issues

In this section I describe how knowledge in tutorials is structured hierarchically by a "Russian doll" structuring of issues. Micro issues are the building blocks of larger micro issues, which in turn make up macro issues (most similar to a conventional notion of "topic"). Macro issues can be seen as following an agenda; a global, pre-planned problem to which a solution is sought, and their fulfilment is crucial to the process of knowledge building in the tutorial. The hierarchical organisation of micro issues within macro issues will be less predictable and be partially constrained by the extent of the students' understanding of the subject.

These levels may be defined in terms of degree of topicality at their boundaries (i.e. a micro *issue* will be connected to another topically, whereas a macro *issue* will stand more autonomously). It is in fact almost impossible in tutorials to mark genuine topic boundaries, since knowledge and information seem to progress gradually, via small gains of information and overlapping issues. Sometimes a topic will loop back to a relevant reference point in a previous topic. In this way topic is neither constantly linear, nor is it

boxed in clearly defined sets.

To sum up: Issues in tutorials form hierarchical relationships. When an issue is a self-contained unit of topic or agenda, it is known as a *macro issue*. Macro issues may contain an infinite number and layering of *micro issues* In a longer extract than those I analyse here, (e.g the whole tutorial), I would expect to find a greater number of levels of issue, and a more complex relationship between them.

2.3. Pedagogic discourse strategies: Relations between and within issues

The previous framework represents an order of hierarchy governed by a principle of *embedding* (micro within micro within eventually macro). A second order of hierarchy is now explicated. In many of the tutorial extracts, but most predominantly within the science extracts, the relationship *between* issues is one of dependency also. Equal sub-issues within a macro issue, are frequently linked by logical and dependent relations, (cf. Winter 1994 and the *nucleus-satellite* relations of Mann and Thompson 1985, 1986). Condition-consequence relations, for example, are common between issues, "if X, then Y". In this way, the full realisation of an issue depends on the execution of a subsequent one; a student may need to understand Y before returning to the problem of X. These relationships between issues I have termed *pedagogic discourse strategies*. *Pedagogic Discourse Strategies* are concerned with *type of relation* not merely degree of relatedness between issues.

Pedagogic discourse strategies also occur within issues, seeming to express the function of the issue, rather than expressing its relationship with a previous or prospective issue. For instance, in the Physics extract, the tutor uses an analogous, simplified equation in order to make the original problematic equation easier to work out and this is expressed in terms of a cognitive progression relation, (If X, what Y?). The relationship between this issue and the previous is only implicit - that of comparison or analogy. Similarly when a complex problem is split up into manageable parts, each part will be governed by a solution strategy; the implicit relation between the two is simply that together they constitute the global solution. It is possible that at a more delicate level of description, (e.g. relations between clauses), this would constitute relations between rather than within issues, but my principal concern for this analysis is to conceptually define issues as relevant constituent parts of a larger knowledge structure.

It is likely that looking at the relations between and governing issues, in **combination with** the concept of hierarchical embedding, will illuminate something about pedagogic/rhetorical strategy; if a student has understood X then they can return to Y, and understanding both X and Y together may lead to understanding Z. In this way *pedagogic discourse strategies* have the interesting property of describing both the structuring of propositions within particular subject areas, as well as being functional strategies deliberately employed to facilitate student understanding.

Below (Fig 1) is the model which sets out the types of pedagogic discourse strategy. The model has been derived from the close study of a larger corpus of tutorial data. Again it should be reiterated that the model is at this stage tentative.

The organisation of knowledge in British university tutorial discourse 543

PEDAGOGIC DISCOURSE STRATEG	TES BETWEEN AND WITHIN ISSUES
JOINT CONSTRUCTION	INFORMING (ONE PARTICIPANT)
1a [Requires] Solution	1b [Provides]Solution
e.g. "What X?/How X?"	e.g. "X is"
2a [Requires] Background	2b [Provides] Background
e.g. "About X?"	e.g. "Incidentally, X is"
3a [Requires] Evidence	3b [Provides] Evidence
e.g. "Why X?"	e.g. "X is because"
4a [Requires] Confirmation	4b [Provides] Confirmation
e.g. "Is X?"	e.g. "Yes X"
5a [Requires] missing information	5b [Provides] missing information
e.g. "Yes X, But What Y?"	e.g. "Yes X, But X is also"
6a [Requires] elaboration on desired	6b [Provides] elaboration on desired
answer	answer
e.g. "Yes X, And X is also?"	e.g. "Yes X, And X is also"
7a [Requires] elaboration under a particular condition e.g. "Yes X, But if Z what Y?"	7b [Provides] elaboration under a particular condition e.g. "Yes X, But if Z, Y is"
8a [Requires] cognitive progression e.g. "Yes X, So what Y?/ And if X, what Y?"	8b [Provides] cognitive progression e.g. "Yes X, And if X, Y is"
9a N/A	9b Refutation (opinion) e.g. "Not X, Y instead"
10a	10b Correction (desired answer)
N/A	e.g. "Not X, Y instead"
REPAIRS (OCCUR AT A	ALL LEVELS)
<i>Repair (desired an</i>	<i>iswer not given)</i>
e.g. "Not X, Wha	it instead?"
(also repetition/clarificatio	on through mishearing)

Fig. 1 Pedagogic discourse strategies: Relations between and within issues

Pedagogic discourse strategies are divided into strategies which are jointly constructed by more than one participant in a question-answer sequence, and strategies which are provided by one participant (usually the tutor). The two categories: a) and b) are comparable at most stages in terms of the logical relations they represent, but tend to signal the extent of student participation or tutor instruction, (although occasionally students provide strategies unprompted). All types of discourse strategy will occur at any level of issue, although *Macro* issues tend to be marked by questions (*what X? how X?*). The relational propositions

(to use Mann and Thompson's term) that these questions signal are also partially predictable. The question "How X?" for instance will tend to signal Winter's "Instrument-Achievement"; the question "Why X?", "Evaluation-Basis". There is also a tendency for lower-level, more embedded issues to be governed by discourse strategies further down the table, e.g. those representing slighter more minimal shifts in agenda, such as the requirement of elaboration on an answer. Knowledge development at this embedded level seems to be controlled by one speaker at the *Follow up* slot of a teaching exchange, which acts as a pivot to either reiterate an issue or to initiate a new one, e.g.: *Yes X but X is also* (sense of incomplete agenda) or *Yes X, and if X what Y*? (sense of cognitive progression).

The model makes a distinction between *corrections* which are suggestive of a desired response, if not fact, and *refutations*, which are more suggestive of opinion within an open debate. A distinction is also made between *repairs* which represent the reiteration of the same material and strategies such as *correction* which actually represent progress within the structuring of knowledge.

In the next section the tentative model of pedagogic discourse strategies between or within issues is applied as a pilot study to a small sample of tutorial data from contrastive subjects: Physics and English Literature and an attempt will be made to establish a relationship between rhetorical organisation and subject epistemology.

3. The analysis

The pilot study analysis focuses on two extracts of tutorial data, representing the subjects of Physics and English Literature. The data was gathered from two universities in Britain. Each tutorial from which the samples were taken lasted one hour, involved eight students in the case of Physics and six in the case of English Literature. Both tutorials were led by male tutors.

The subject variable is an extremely salient one in this analysis, and contributes considerably to both choice of teaching method and the types of information structures which occur. In fact both samples are consistent in representing quite traditional, teacherled discussions. However in terms of rhetorical organisation, I would expect the Physics tutorial to represent more complex, cyclical and hierarchical structures, in which the fulfilment of one issue is a necessary condition of understanding a previous or subsequent one. The details of this observation, and a discussion of its implication occurs in more detail in section 4, *Discourse Strategies and Subject Identity*.

What follow are two complementary realisations of the pedagogic discourse strategy analysis applied to the two tutorial extracts. The first is shown in conjunction with the tutorial data texts and identifies both issue type and the relationships between them. The second is a more holistic representation of the tutorial extract in diagrammatic form and renders the hierarchical knowledge formation more explicit.

3.1. Explanation of coding: Text analysis

This explanation of coding precedes the text analysis.

In this representation of the analysis, significant focuses of information within the issues have been identified which aim to demonstrate the key "points" of each issue, and signal my criteria for identifiying issue boundaries. These are boxed:



(sub-sub-micro issue)

(This represents the extent of embedding within the short extracts, but the *potential* for embedding is obviously greater than this.)

Repairs are indicated by underlining. The discourse strategy types are indicated in writing and with their corresponding number code. Where they occur *between* issues they can found on the right hand side of the data linking two issues; where they occur *within* issues, they can be found above the relevant bit of data. In the pedagogic discourse strategy framework examples I used abstract letters (X,Y and Z), but in the analysis, the letters actually represent the focus of the issues, also labelled on the diagrams representing information structure, and their progression can be charted through the extract. Letters are chosen simply on a logical alphabetical basis as they occur to represent concepts in the extract.

The small samples of data are selected using the criterion of topic-orientation, (i.e. each extract represents a self-contained topic). I term the whole extract "macro-issue", but am aware that within the context of the larger tutorial, they themselves will probably be hierarchically dependent, or even contained within bigger issues. The classification of issue types is based on the criterion of "dependency" to the previous issue. So a micro issue will be recognizably distinct from the previous issue, yet a component of the larger problem, and within this, there may be further micro issues. However, the introduction of issues tends to be signalled by a range of devices, as outlined above; so macro issues are almost invariably prefaced by "What X?" strategies, and so on. In a more advanced study, interscorer agreement tests could be used.

The coding: SA, SB etc. denotes the different students within the group and T denotes the tutor. Asterisks signal that the data was at this point inaudible to the transcriber.

The context and details of subject matter covered by each extract is covered in the discussion section (3.5).

3.2. Analysis of issues and pedagogic discourse strategies in conjunction with tutorial texts

PHYSICS TUTORIAL
T: Right, when we've got that far, the rest is in fact the first bit is fairly easy;
macro issue (x) [Requires] Solution (What x?) (1a)
we're then asked to calculate what the magnitude of the current would be for a certain magnitude of voltage
and you all know of course, I hope that [Requires] Solution (How x?) (A) (1a)
micro issue I [Hequires] Cognitive Progression (If X1, what A?) (8a)
if you want a current IRMS for example and you know the IRMS what's the thing that relates the two together?
SA: micro issue 1 Solution: (A is)
Magnitude of Z
\mathbf{r} represents the extent of embedding within the short extracts, but the potential \mathbf{r} :
micro issue 1 [Provides] Confirmation (Yes A) (4b)
The magnitude of Z; good. (writes on board) So mod Z.
micro issue 1
So if we work out mod Z
[Provides] Cognitive Progression (if a, x is) (8b)
macro issue (x)
then we'll be able to get the current we require.
So looking at [Provides] Solution (B(How 42)) 1a
micro issue 2 (B)
the expression for Z
you'll notice
micro issue 2
we've got R1 plus R2 there and then we've got all this multiplied by the J,
so straight off then, mod Z? Right Matt, [Requires] Cognitive Progression (if, what B?(A))(8a)
micro issue 1
how do we get mod Z from that?

micro issue 2 (Coanitive Progression) (B is) (Thwarted)
That squares with ** and then square root over	- And the second second
ANYO, MA SA SHIE DE AREA SA	nd surely I denie
repair I (micro issue 2) T: [Yeah]. OK <u>tell me what to write.</u>	
3G: Um	the state of the
nicro issue 2 (Cognitive Progression) (B is) (THWAR	TED)
R squared [noR] R1 squared (<i>pause)</i> omega squared, L squared, L1 squared sorry	tald date and be
F: [Pardon?] (writes on board)	uch, Pan Anch (Ph)
micro issue 3 (initiated by unfulfilled agenda) Para	Ilel/Simplified Solution
Let's go back a step.	
nicro issue 3 [Requires] Cognitive Progression (If Y, how A?) (C) (8a)
If I call this A plus J B, how would I write the	magnitude?
Complex number A plus J B. SG: micro issue 3 (Coanitive Progression) (C is) (THWAF	TED)
A squared plus B squared equals **	,
I Parton brup p parter eduarp	
a sdaaroa bras p sdaaroa cdaars	
repair 1 (micro issue 3)	
repair 1 (micro issue 3) T: A squared plus B squared?	
repair 1 (micro issue 3) F: A squared plus B squared? GG:	
repair 1 (micro issue 3) T: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is)	e anto 1117 stati n occasi di sun orden- li Regardine Prostanti chen 7, 17, 1200 norma di sun orden e
repair 1 (micro issue 3) T: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is) *****	sing Information
repair I (micro issue 3) T: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is) ****** [Requires] Mis (Yes C, But V	sing Information Vhat C1?) (5a)
repair 1 (micro issue 3)	sing Information Vhat C1?) (5a)
repair 1 (micro issue 3) F: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is) ***** [Requires] Mis (Yes C, But V sub-micro issue 3a (micro issue 3) Picht So what is A2	sing Information Vhat C1?) (5a)
repair 1 (micro issue 3) T: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is) ***** [Requires] Miss (Yes C, But V F: sub-micro issue 3a (micro issue 3) Right. So what is A?	sing Information Vhat C1?) (5a)
repair 1 (micro issue 3) T: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is) ****** [Requires] Mis (Yes C, But V Sub-micro issue 3a (micro issue 3) Right. So what is A? SG:	sing Information Vhat C1?) (5a)
repair 1 (micro issue 3) F: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is) ****** [Requires] Mis (Yes C, But V F: sub-micro issue 3a (micro issue 3) Right. So what is A? SG: sub-micro issue 3a (micro issue 3) (C1 is) Planka P0 (1+1)	sing Information Vhat C1?) (5a)
repair 1 (micro issue 3) T: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is) ****** [Requires] Mis (Yes C, But V Sub-micro issue 3a (micro issue 3) Right. So what is A? SG: sub-micro issue 3a (micro issue 3) (C1 is) R1 plus R2 [**]	sing Information Vhat C1?) (5a)
repair 1 (micro issue 3) T: A squared plus B squared? SG: micro issue 3 Cognitive Progression (C is) ***** [Requires] Mis (Yes C, But V Sub-micro issue 3a (micro issue 3) Right. So what is A? SG: sub-micro issue 3a (micro issue 3) (C1 is) R1 plus R2 [**] T: [Right]. sub-micro issue 3a (micro issue 3) [Provides] Confirmation (Yes C1) (sing Information Vhat C1?) (5a)

1

sub-sub micro issue(i) (sub-micro issue 3a, micro issue 3) and surely I don't have to tell you that R1 plus R2 all squared is not the same as R1 squared plus R2 squared ... OK. [Requires] Missing Information (What C2?) (5a)sub-micro issue 3b (micro issue 3) And the other bit? SG: sub-micro issue 3b (micro issue 3) (C2 is....) Would be em L1 plus L2plus 2M Correction/MoreInfo (10b/5b)Т: sub-sub micro issue (sub-micro issue 3b, micro issue 3) it's actually plus or minus, we have two different answers S. (C2 is..) sub-micro issue 3b (micro issue 3) ** T: Wait I'll come back to that. sub-micro issue 3b (micro issue 3) (Yes C2 ... Plus or minus 2M all squared [Requires] Missing Information (Yes C2, but what C3?) (5a) sub-micro issue 3c (micro issue 3) and you've actually missed one thing out SG . sub-micro issue 3c (micro issue 3) (C3 IS ...) Omega T: sub-micro issue 3c (micro issue 3) [Provides] Confirmation (Yes C3) (4b) There's an omega in it as well, [Provides] Confirmation _ micro issue 3 (Yes C) (4b) yes. All square rooted. Now, think carefully;

The organisation of knowledge in British university tutorial discourse 549

sub-micro issue 3d (micro issue 3) if it was plus or minus 2M all squared, it wouldn't matter whether it was plus or minus but we've got to subtract or add it to this before we square. You've only got to put a few numbers in your head and [Provides] Elaboration under a particular condition (if C, then D, but E...so Cx2) (7b) sub-micro issue 3c (micro issue 3) you'll realise that it does matter, will give us two different answers, OK? Right. [Provides] Cognitive Progression (If C(x2), then A(x2)) (8b) micro issue 2 So that's mod Z; in fact all of those things .. em values for all of those things were given in the question [Provides] Cognitive Progression (If then Ax2is ...) (8b) micro issue 1 so you can now work out two answers; one with that as a plus, the other with [Provides] Cognitive Progression that as a minus and (If Ax2, then A is...) (8b) micro issue 1 the answers you get for mod Z are three twenty three or three 0 eight ohms depending whether you use the plus or the [Provides] Cognitive Progression minus, (If A then X is..) (8b) macro issue (what x?) and clearly that will give you the current.

So therefore I, and that gave us two answers; three point two five milli-amps or three point one 0 milli-amps. Several people got at least ...got one of those answers or one pair of those answers, but nobody spotted that there should be two answers in each case. Are there any points there that any one is puzzled about, any difficulties? OK? right. The next bit

ENGLISH TUTORIAL

T: Now macro issue (x)if someone was to say to you, "what is Mrs Dalloway about?", I know those of you who've read Mrs Dalloway, most of you have cause you did it for me last semester; macro issue (x)would you feel more confident that you could say what it was about? Could you..would you be giving a series of questions or a series of answers? SA: (micro issue- thwarted) (X is) [Well eventually it is....] Solution (what X ? ((A)-(F)))(1a) micro issue 1 (X is (A)) S?: [***] SA: Well yeah exactly micro issue 2 (Yes A) that's a good..good answer there... but [Provides] Missing em eventually you can give answers that are ... Information/Refutation that are.. take a lot of reading, but you (But Also B (Not A?) know that there is something there that you can actually get hold of (5b/9b)micro issue 2 whereas with what there seems to be, there's not.... there's not the impression there that you could actually make sense of it anyway, [Requires] Confimation [it doesn't matter] that you can't at all. (Is X .. ?) (C) (4a) Т: micro issue 3 So does that ...] So there is a figure in the carpet in Mrs Dalloway[....you] think [Provides] Missing Info (Yes C, but also D) (5b) SA: micro issue 4 [Yeah.] But there is your own figure in the carpet, I mean everyone probably has a different one Refutation (Not C or D, but I think you can find that. but E instead) (9b) T: Right. Em.. well those who know this story,

he have with me managing that theme was n	- Figure
in the carpet, not even one that we could m ourselves or or not?	lake
nicro issue 6 (metasequence) [Requires] Solution (What mear	ns term X? (X1)) (1a)
Em I'm not entirely clear what we mean by a in a carpet	figure
because this thing that it alludes tothis	s critical [em].
	[Provides] Background
	(About X1) (2b)
sub-micro issue 6a (micro issue 6 metasequence)	ad any entert between them
it's a remark of Henry James's	
where he talks about, that although his his o seem initially mystifiying er that eventual	er fictions may lly
micro issue 6 (metasequence) Solution (X1 is)	
it's rather like looking at a carpet with be just a kind of, you know mixture of color you eventually see a figure in it.	. which seems to urs and so on,
SB: Right. (Solution con) T: Or you look in a fire and see a face, you that kind of thing, that he said that there's eventually there is a figure to be seen here	know s . There
is a clear distinct pattern in this fiction emerges on, you know extended study of some	which [Provides]Backgrour kind. Em (About X1)(2b)
sub-micro issue 6b (micro issue 6: metasequence)	
so what Lodge is saying is that's what typi writing;	fies modernist
micro issue 6 (metasequence) repetition Solution	
modernist writing seems initially often quit quite obscure and so on, but eventually it's that there's a figure in the carpet	te confusing, s written with the idea
that there is a definable	
SB: Right	
I: meaning there somewhere. (Pause) So[Yor response seems to suggest that for you anyway	uryour] y
nicro issue 5 (repetition)	g where in the Physics estimate
there is no figure in [that particular carpo	et.]
Ch. [mboro(a mito a l	(get, got you and her
n. [mere's quite a]	IRequires Confirmation
	[

micro issue 7 (Yes E)
not not a figure as such, but
em. an overlasting impression that I came away with, [Provides]Missing Info (Xos F. But also E) (5)
micro issue / (Tes Ebu also F) (5
of how it was written.
T: Right. [Provides] Evidence (F is because) (3b
SB: the craft the em the very clever plays on words and very clever allusions,
sub-micro issue 7a (micro issue 7)
even if you didn't understand them you laughed when you read it,
you thought, "That's really witty" Em. (laughs)
[Requires] Confirmation
T: (laughs) sub-micro issue 7b (micro issue 7)
So understanding and the humour and the understanding don't go together [here].
[Provides] Evidence SB: (Yes F is because) (3b) sub-micro issue 7c (micro issue 7)
[Em]probably not, no. You can appreciate it on a certain level em and admire it really.
T: Yep. Befutation (Not F. G instead) (9
SE: micro issue 8
I found that if I didn't understand it I just got frustrated rather than laugh.
SB: Right. [Provides] Evidence (G is because) (3b)
SE: And ifif there was I mean <pre>sub-micro issue 8a (micro issue 8)</pre>
there were a lot of references to things that I'd never heard [of or] hadn't readem
SB: [Yes]
SE: micro issue 8 (repetition) [Provides] Confirmation (4b)
[it gotfindingfinding ** so pissed off]
(laughs)
SB: micro issue 8 (repetition) [Provides] Confirmation (4b)
[get got you annoyed] (laughs)

3.3. Explanation of coding: Diagrammatic analysis

This explanation of coding precedes the diagrammatic analysis.

Micro issues are contained (in a dependent and infinitely embedding relationship) by macro issues. Repairs (in dotted line box) are usually moves which do not significantly contribute to the development or structuring of knowledge, e.g. incorrect answers in close-ended elicitation sequences (the identical reformulation of the question merely represents a loop, and the "wrong" answer has not contributed to the knowledge structure as an autonomous entity), clarificatory moves and repetitions through mishearing for example. Repairs may occur at any level of issue. The arrows in the diagram represent the direction of the temporal flow of information. These also contribute to the hierarchical structuring, since their direction indicates the way in which the fulfilment of one issue unit contributes to the understanding of a previous one, (and this is particularly so in the science tutorials). Dotted line arrows represent the direction of issues which are implied rather than explicit. In other words, if a micro issue implicitly contributes to a macro issue, this relationship is signalled by a dotted line. The *order* of macro/micro issues and movement between them is indicated by Roman numerals, (repairs and sub-micro issues are not marked in this way).

3.4. Diagrammatic versions of 2 analyses







Fig. 3b: Diagrammatic representation of the structure of issues in the English extract

3.5. Discussion: Analysis of physics extract

This extract was structured in a satisfyingly neat and ordered way, and is possibly typical of science tutorials. The tutorial from which the extract was sampled was in fact highly formal and tutor-led, and for that reason we would predict a tight logical structure as well as the structure which logically resembles the method of the subject.

From the diagram it is clear that knowledge in this extract is basically structured following a top-down approach. The macro issue (or problem), "What is the magnitude of current?" is provided by a hierarchical chain of minor solutions : the initial solution is to "find the magnitude of Z", but in order to work out how this occurs, it is first necessary to understand the "expression for Z". Understanding this expression actually requires a further breakdown into a simplified expression, which involves dealing with two halves in turn. An understanding of the most simple level of the problem then informs the level above, and this in turn allows the students to proceed finally to an understanding of the main problem. Very basically this may be summarised: What is X?, How X? (A), How A? (B), How B? (C); C is..., therefore B is...., therefore A is...., therefore X is....

In more detail, the extract charts the following process, (this can be understood most easily by following the coded samples of data above (Fig 2a): The tutor poses the macro issue, or problem X ("what is the magnitude of current?"). In order to work this out, the magnitude of Z must be discovered (**How** X?) - a process of *cognitive progression* (If X1, what A?: "If you want a current IRMS and you know the IRMS, what's the thing that relates the two together?"). This *micro* issue, A (A = How X?) cannot be worked out until

the expression for Z is gained (How A?: "So looking at the expression for Z"). The same cognitive progression is here implied, but not explicitly stated. This micro issue, B (B = How A?: "How do we get mod Z from that?") is posed to the students but they are unable to work out the answer. After two thwarted attempts the tutor refigures the problem by asking for a simplified expression for Z via cognitive progression (stage (8a) in the discourse strategy framework: "If I call this A plus JB, how would I write the magnitude?"). Within this micro issue, (C)- the simplified expression for Z, a number of embedded micro issues occur. These represent parts of a whole, so tend to be formulated in terms of what has been omitted, e.g. "And the other bit" - stage (5a) in the discourse strategy framework. The first two represent two halves of the equation, which are worked out separately to avoid confusion, "What is A?"; "And the other bit?". The third sub-micro issue represents a part of the equation missed out: "omega". The fourth sub-micro issue represents a condition by which the equation will yield two answers (because square rooted). Finally the students are in a position to understand issue (C), with the added condition that it will consist of two answers (Cx2), ((6b) in the discourse strategy framework). With this gain of the simplified expression, it becomes a quick route back to understanding issue (A) - the magnitude of Z. The tutor finally signals how the gain of this answer will lead finally back to the macro issue (X) - the magnitude of current - and provides the two responses for the students. This phase is predictably signalled by the same strategies that marked the outlining of the route to the solution at the start, as the problem comes full circle in resolution: (8b) - the strategy which signals cognitive progression. The extract revealed some tentative (but by no means conclusive) trends. Firstly, there was a marked tendency for pedagogic discourse strategies to be employed which represent cognitive progression or elaboration under certain conditions, ("Yes X and if X then Y", "Yes X but if Z then Y" - strategies 8 and 7). This relationship of dependency between concepts bears a striking resemblance to what has been understood as scientific method in section 1.2: Subject Identity. This will be explored in more detail in the next section. It also bears considerable resemblance to Winter's (1994) logical sequence relation, about which Winter says:

At its simplest, the logical sequence relation is concerned with representing selective changes in a time/space continuum from simple time/space change to deductive or causal sequence which is modelled on real world time/change. (Winter 1994: 52)

Secondly, there was a tendency for strategies which *provided* knowledge, rather than *eliciting* it, (b. strategies rather than a.). This would seem to reflect the already established tutor-led and traditional style of this particular tutorial. The one strategy which tended to elicit rather than provide, was 1. - "Yes X but what Y?" which characterises reinitiating sequences in search of a closed response, again typical of this sort of tutorial.

3.6. Discussion: Analysis of English extract

If the science extract can be said to reflect a global pattern of *subordination* of issues, or recursive embedding, (cf. Winter's *logical sequence relations*) then the English extract reflects a pattern of *coordination* of issues, (cf. Winter's *matching relations*) in which the accumulation of a number of micro issues contributes collectively to the open-ended

resolution of the macro issue.

The tutorial is extremely open-ended and exploratory. The nature of the subject matter (post-modernism) means that it is not a goal-oriented problem-solving session. Views tend to be proposed then either supported or refuted. The tutor has a key role in consolidating accumulated knowledge and clarifying unclear positions and the event comes perhaps closest to abstract debate. In this discussion, knowledge doesn't seem to represent collective understanding, but individual opinion or speculation. There is a good deal of thesis-antithesis but not very much synthesis. The topic development and knowledge structure is much harder to ascertain in this extract, but looks something like this: The main topic or Problem is: "Can the text be "about" anything ?", ("Is there a figure in the carpet?") the subtext of this might be: "What is the point of literary criticism?".

The patterning of this seems to reflect the nature of free debate. It is initially interesting that the students take responsibility for channelling and evaluating knowledge. It is also striking that issues are initiated "back-to back" without the expected response (e.g. micro issue 8: "I found that if I didn't understand it I just got frustrated rather than laugh"). The students are proffering opinions, (possible solutions) coupled with evaluations of the previous opinion. Their responses are like satellites around the main"problem". This sort of brainstorming session is typical of informal arts tutorials and is ideally coupled with proper pooling and consensus evaluation of ideas as well as consolidaton and clarifying of the stage and state of knowledge, as indeed it is at other points in the tutorial from which this extract was taken.

In more detail, the tutor opens up the macro issue with a question; in effect: "Is there a meaning in the text?" (What X?). What then follows is a relatively simple linear collection of opinions (micro issues 1-8). The micro issues are not however arbitrary or isolated; they usually comprise either a modified version of the previous issue: elaboration (6b) or provides missing info (5b): "Yes A and/but also B", ("So there is a figure in the carpet in Mrs Dalloway [...you] think?/ Yeah But there is your own figure in the carpet ... "), or a refutation (9b) of the previous suggestion and proferring of an alternative: "Not F, G instead", ("..those of you who know this story, be happy with me proposing that there was no figure in the carpet."). The relationship between issues is therefore either one of overlapping knowledge: knowledge progresses by a collaborative pooling of opinion, and one opinion attempts to "improve" upon a previous one by accepting its value, but at the same time building upon its perceived inadequacies, (Winter terms this sort of relation Matching: Comparative, (1994: 51); or alternatively it is a relationship of thesis-antithesis where paradigms are built up then knocked down and replaced. This sort of relation is described by Mann and Thompson as Antithesis (1992:52) and by Winter as Matching Relation: Denial and Correction (Winter 1994:50). In contrast to the other extracts, responses or opinions are mostly supported by "because" clauses, [provides] evidence (3b) which suggests that there is an academic need to justify and support subjective statements. Finally, the English extract also contained instances of Requires Confirmation (4a), suggestive of a cooperative negotiation of meaning, ("so there is a figure in the carpet in Mrs Dalloway ... you think?").

To reiterate; the four most common types of relation found in the English literature extract are represented in Pedagogic Discourse Strategy terms by *provides elaboration* (6b), *refutation* (9b), *provides evidence* (3b) and *requires confirmation*. There is nothing representing logical progression via existing conditions of knowledge. Unlike the physics

The organisation of knowledge in British university tutorial discourse 557

extract, no Discourse Strategies are jointly constructed via question-answer sequences, but the provision of them is shared between tutor and students. Students frequently initiate issues, which they never do in the physics extract. One interesting feature of this extract is the existence of a free-standing micro issue (metasequence), seemingly outside the macro issue. The micro issue (X1) is actually questioning the terms of the macro issue. This is arguably a reflection of knowledge development in a postmodern setting whereby students are encouraged to continually question the academic enterprise and the meanings engendered by a form of questioning. This will be discussed further in the next section.

No finite "solution" to the macro issue is presented or agreed upon as one would expect in this sort of tutorial. All micro solutions are referred back to the macro issue, but only implicitly (dotted line arrows), and no consensus is reached about one preferred response. Although the micro issues seem to build upon one another, any real sense of hierarchy or dependency is lost because these are merely subjective opinions which cannot be ultimately validated. So in this way the linear progression does not in fact represent an objective progression of ideas towards a more "factual" state of knowledge. A well-argued essay in English is likely to yield a more progressive and logically ordered argument, but in a democratic and unplanned gathering of individuals, no one opinion is able to hold sway.

4. Discussion: Discourse stategies, disciplinary identity and educational implications

In the introduction, I briefly outlined the epistemological structure and method underpinning the two subjects. I hypothesised that tutorial discourse will to a certain degree reflect such "core" structures of the disciplines, whilst at the same time anticipating that the spoken genre of the tutorial per se will reveal other structures of a more purely pedagogic nature. In some senses these two types of structuring reflect Martin's distinction between experiential and rhetorical relations (internal/external relations, Martin 1992: 178). It is already clear even from the qualitative descriptions of both of the short extracts that subject identity is indisputably reflected in the discourse strategies and structure of knowledge generated by the sessions. It also looks possible that such structures and patternings quite closely reflect subject methodology, more conventionally described in relation to written texts or long-term processes, (e.g. a series of experiments in physics).

In this section I aim to relate my analyses to the more general descriptions of subject identity and methodology. I shall also bring in case studies investigated by other researchers into subject-specific tutorials and relate the whole discussion to subject-specific methodologies for tutorials.

4.1. The science tutorial

The knowledge structures generated within the physics tutorial adopted a "top-down" followed by "bottom-up" approach to solving problems. In other words the largest problem (macro issue) was broken down into smaller and smaller pieces until it reached a level which the students were able to identify with. The gradual accretion of solutions to all these parts were then built back up in reverse order in order to eventually solve the macro

problem. This corresponds very much to the description provided by Becher (1987) of pure science subjects (physics in particular) as being *atomistic*; the process of accretion of knowledge by pieces. In fact Becher is referring to the process of the discipline *as a whole*, rather than in terms of small problem-solving, yet the metaphor is still apposite. In terms of descriptions of science methodology, it has to be remembered that physics tutorials are almost always revising known formulae, and not arriving at new knowledge either by experiment, observation or deduction. However, logical reasoning is also the same process which governs the revision or learning of scientific propositions in tutorials and may be loosely related to dependency of the solution of one proposition (or sub-proposition) upon another, and the common discourse strategy, *Yes X, and if X, what Y*?. Similarly the definitions of scientific method proposed by Schwab (1964) which describe how data is interpreted in the light of previous knowledge, may be related to the dependency of the solution or interpretation of a proposition upon existing conditions: *Yes X and if Z what Y*?

The types of discourse strategies observed in the extract correlate to a great extent with the observations of Ogborn et al (1977) in their investigation into the language and strategies of small-group teaching in physics at university level. They set out to chart the "growth of ideas in discussion" (p.103); a very similar aim to my own. The authors describe critically the typical physics tutorial process consisting of a "what is...?" question elicited by the tutor, a response by the student and an evaluation by the tutor; highly reminiscent of the typical physics episode in my own data. In descriptions of alternative processes, they define the "Alpine Guide" or "step-by-step" method of knowledge growth in which the answer to one posed question allows logically for the next one to be asked, and this forms a step-by-step exposition of a certain principle. This is very much an example of many equal, short issues combining to form a macro issue; students are led step by step towards the solution of major problem by filling in slots provided by the tutor to minor problems. Ogborn et al describe this method thus:

Arguments in physics are difficult and intricate. One way of keeping going is to lead step by step by a series of questions. Each step in the argument is turned into a question, and each question expects an answer which will in turn permit the next question... The tutor acts rather like an Alpine guide putting the feet of his party of amateur climbers carefully into every foothold.... Every question is formed so as to contain the logic of the next step. (p.113)

The process is instantly recognizable from both the extracts. It is a carefully monitored, tutor-led style, but one in which questions perform a crucial role in testing the understanding of students, (rather than, for example, simple instructional monologue from a tutor). The need for such a controlling style is, as Ogborn et al suggest, because arguments in Physics are so complex, but need to be thoroughly understood for progress to be made. It is perhaps arguable that a highly complex discipline such as physics in which thorough understanding of smaller "atomistic" components must be achieved, is in fact better served by individual attention and a pedagogic method approaching "scaffolding learning" even at tertiary level.

The description of the "Alpine Guide" method also reflects the high incidence of hierarchical relations between issues apparent in the extract, *Yes X and if X, what Y?*. Ogborn et al go on to suggest that the "Alpine Guide" metaphor extends to describe relations between issues or "distance between footholds". When a tutor reinitiates and reformulates a problem due to an absence of understanding, the distance "between

The organisation of knowledge in British university tutorial discourse 559

footholds" is shorter in terms of cognitive progression. This is seen to good effect in the physics extract, when, after two abortive attempts to elicit the answer to a problem, the tutor recasts the problem using a particular condition, "If I call this A plus JB..." and then divides it into sub-issues: "So what is A?", "And the other bit?". It is a narrowing down process in which the method is more and more explicitly delineated by the tutor, perhaps with a view to impressing the route to a type of problem-solving upon the memory of the students.

In many ways, science tutorials reflect an idealised scientific method, in which atomized parts of knowledge fit together in a tight, closed and finite structure. It reflects the existence of *paradigms* in scientific practice, which are tacitly accepted by members of the community and contribute to coherence in the description of scientific knowledge. Interestingly Ogborn et al (1977) refer to a register they term "scientish" which they liken to textbook prose, and argue that "scientish treats of an idealised generalised world.... Many of its objects are abstract classes of idealised object... The drama they play out is a logical one." (pp.110-111). It could be argued that it is precisely this idealised framework which governs such a simplified and universal body of scientific knowledge.

It is certain that, at any rate, none of the science tutorials in the larger study (Benwell 1996) reflected a more philosophical concern with the uncertainties and tentative nature of scientific knowledge. In an investigation of whether the views of Popper and Kuhn have penetrated the education system in terms of written texts, Rowell and Cawthorn (1982) similarly argue that with the exception of a small element of "Popperian critical rationality", the texts "portray science as some inexorable linear pursuit of truth" (Rowell and Cawthorn, 1982: 93).

The other obvious factor governing the finite nature of knowledge structures in these disciplines, in which the unequivocal and singular solution to a problem is always reached, is due to the function of the tutorials, which are invariably one of *revision* of learnt formulae, often in the form of testing by application to problems. In other words, it is not only the epistemology of the subject which assures its close-endedness, it is also the strict agenda of the tutorial which aims to cover a finite and known amount of knowledge within an hour. Again, potential alternatives to such teaching methods, e.g. self-discovery learning based on experimentation, more likely to occur in lab classes, are not the preserve of these traditional tutorials, and such methods would therefore not be reflected.

4.2. The arts tutorial

The English tutorial revealed a highly contrastive patterning of discourse strategies and structuring of issues to the science extracts. Knowledge in this tutorial progressed organically, and its parameters and relationship to a macro issue were less determinate than those of the Physics extract. This pattern reflects Becher's (1987) observations about arts and social sciences whereby he describes knowledge as "organic", "holistic" and growing in a "complex and comparatively unpredictable way". It is striking that the English extract does not *explicitly* loop back to address the macro issue, "Does the text have a meaning?"; rather it allows the tutorial to become a forum of well-argued opinion. Again, as it has been frequently noted, humanities tutorials (and English literature in particular) are open-ended, subjective and their structure cannot be predetermined. The process of discussion in the arts

tutorial is an end in itself rather than a means to an end. Any kind of "end" can only be achieved in terms of a loose conglomeration of consensus-agreed statements. The formulation of substantiated statements, often in antithesis to previous statements, *Not X, Y instead...because...* or at least modifying, improving upon previous statements: *Yes X, but also Y/and also Y... because...* is suggestive of a subject in which (as Becher terms it) the "author's vision is at the centre of its interpretation", but also a subject which proceeds and progresses through rational debate, argumentation and what Mercer (1995: 104) terms "disputational talk":

..knowledge can be created out of the conflict of ideas as much as through the accumulation and combination of them. (Mercer, 1995: 84)

The English tutorial represented genuinely open-ended, exploratory and student-centred discussion. The forms and patterns represented in the extract reflect Mercer's most ideal form of collaborative disussion: "exploratory talk" (1995: 108). Mercer describes *exploratory talk* as talk in which partners engage critically but constructively with each other's ideas. He outlines typical discourse features associated with *exploratory talk* as being "knowledge made publicly accountable", and "reasoning visible in talk", (p.108). In the English extract students seem culturally adapted to the premise, "opinions must be rationally justified" hence the high proportion of "because" clauses subsequent to responses.

The notion of debate is also focussed upon by Phillips (1992), who argues for the promotion of an "argumentative frame" for small-group discussion: "..group talk in which speakers set out to challenge their own or someone else's ideas, values, understanding, attitudes or opinions." (p.151). Phillips also argues that highly rational debates, which move, science-like through the rejection or assertion of certain claims towards a finite response, are not the only valued forms of argument:

Exploratory discussion expressed in a less explicitly logical language, and discourse to play with ideas rather than persuade, are also forms of argument. (p.151)

The structure of discourse and the holistic, almost whimsical flow of opinions in the English extract seems appropriately encapsulated by this description. In these descriptions of the possibilities for small group talk, Phillips is of course moving towards a discussion of the larger aims and philsophies of discussion-based arts teaching. The current paradigm in English studies is arguably poststructuralism, whereby the focus of interpretation is directed frequently to *values*, whether these are the historical or social values of literary texts or the values of traditional criticism. Post-structuralism also encourages a plurality of interpretation. But does the English extract actually reflect this sort of current philosophy?

In an article "Welcome the Crisis!: Rethinking learning methods in English studies", Miall (1989) addresses the misalignment between the recent theoretical developments in English studies, and the teaching methods which remain concerned with the interpretation of texts. He claims that "...present day teaching of English... often exhibits a curious contradiction between philosophy and practice" (Miall ibid: 73). Miall argues that despite the rejection of singular interpretation of texts by most modern academics, the actual teaching of such texts still embodies an ideology of control in which the tutor proffers or directs interpretations. This, Miall argues, leads to a scenario "in which

The organisation of knowledge in British university tutorial discourse 561

both the literary texts and the critical theories dominate the student instead of enabling her to gain interpretive authority in her own right." (1989: 73). Miall's solution to this problem is the advocation of student-centred learning, whereby students govern and pose their own agendas, over which the tutor presides in a purely guiding, overseeing capacity. It is not hard to illustrate the claim that current methods and philosophies are reflected in this extract, with some examples. Firstly, the English extract is dominated by a thoroughly postmodern macro issue: Is there a meaning in the text? Secondly, the actual terms of the problem are critically questioned by a student: "I'm not entirely clear what we mean by a figure in the carpet.". Thirdly, the students proffer, but without resolution, various justified opinions. The various opinions, often couched in terms of opposition (Not X, but Y instead) are nevertheless not qualitatively or hierarchically ordered; no one opinion is finally lighted upon as the answer to the problem. Like any good debate, the various statements, reflections and opinions will come together holistically (but not like a neatly fitted puzzle) to respond (and perhaps over a period of time after the tutorial is over) to the macro issue raised. As Becher (1987) suggests, where progression in science is usually marked by clear criteria for establishing or refuting claims, and methods deal with quantifiable and universal entities with a view to "neatness and simplicity of explanation"; progression in arts in characterised by lateral thinking, interpretation and the challenge is "to make sense of complexity rather than achieve a simple explanation." (p. 273).

5. Conclusion

By the explication of units of discourse known as *issues* and the relations that hold between and within them, this paper has been able to provide a small and tentative contribution towards the systematic description of the way in which knowledge is structured and negotiated in university tutorials. At this stage the model is obviously non-generalizable, based as it is on a comparatively small amount of data and appplied only to these two small extracts. Nevertheless it is hoped that such a pilot analysis may provide the starting point for the development of a more rigorous model.

The above analysis demonstrates that there is probably a relationship between the epistemological properties of a discipline and the way knowledge is generated within subject tutorials. This relationship is firmly reflected in the issue structures and relations between and within issues (pedagogic discourse strategies) and forms one important aspect of the description of the tutorial as a coherent *genre*.

Tutorials are distinguished by subject, and their epistemological underpinnings seem to bear heavily upon what I have termed *pedagogic discourse strategies*. It is arguable that such a relationship represents, in a pedagogical terms, rather a narrow set of possibilities for the transformative potential of the tutor and the tutorial process. If a predetermined epistemology is being directly realised in tutorial teaching, is there any space for the negotiation of received knowledge? However it is still unclear to what extent the discourse strategy patternings map onto the subject methods and procedures, found for instance in textbook argument or empirical processes. The margin of disparity suggests that subject epistemology itself is being transformed via the process of being "talked" in tutorials. This suggests a kind of conflation between Martin's internal (rhetorical) and external (experiential) relations. It also suggests that through the generic processes of the

historical, social event known as the tutorial, subject core is being realised as a form of "culture". Using a Bakhtinian framework, Mercer describes this role and process of "talk" in relation to classroom teaching, :

...talk is used to construct knowledge. This is a social, historical process, in the sense that the talk generates its own context and continuity, so that the knowledge that is created carries with it echoes of the conversation in which it was generated. (Mercer 1995: 84)

Lemke (1982) in a discussion of university-taught Physics further elaborates this process:

Talk, including the uses of blackboard and apparatus that we integrate into our talk, is an activity by which we and our students come to share a system for making meanings that we call physics. (p. 263)

He refers to generic stretches of discourse ("thematic systems"); combinations of words in particular contexts, favoured grammatical constructions, rhetorical patterns (e.g. analogy), and to this list I would add discourse strategies. We can obviously appreciate the close relationships such "thematic systems" bear to the core identity of a subject, but at the same time recognise that these are uniquely realised through tutorial discourse.

Finally it is necessary again to address the thorny issue of the *mode* (communicative channel) of tutorial interaction. Throughout the paper it has been maintained that knowledge structuring will be realised differently in spoken interaction compared to written texts. This has already been demonstrated in terms of joint construction of knowledge (most commonly question-answer sequences), but is also demonstrated by the reiteration, clarification and finer embedding of issues (most clearly seen in the step-by step/Alpine guide of the physics extract) which highlights again the importance of a *collaborative* model, but also the need for a model which can accommodate *non-agenda-ed* talk (i.e. sequences which can't be predicted by the epistemological methodology of a subject). A further modification would be to incorporate the exclusively socio-emotional utterances into a model which seeks to explicate knowledge formation in teaching contexts. My approach acknowledges the importance of the metadiscourse, humour and encouragement in tutorials, but chooses to treat such discourse separately from propositional content. A fuller exploration of the genre of tutorials and of pedagogic strategies would need to combine these approaches.

In conclusion then, it remains to evaluate and reiterate the benefits of the pedagogic discourse strategies/issues framework. One of the main aims of the paper was to work towards the development of a model of knowledge structuring in tutorial discourse. Various other frameworks, mostly relating to written text, were considered, but found to be not entirely successful in describing either spoken discourse or specifically tutorial discourse. The development and pilot application of the framework might suggests that a genre-specific model is more relevant to the explanation of *situated* language use than a set of categories that is taken to be applicable to all discourse (e.g. RST). Secondly the development of the model has provided possible evidence that pedagogic practice can be laid bare through the application of a rhetorical analysis. In both examples of data it was shown to what extent the teaching process was aligned to current epistemological paradigms. Such an approach could prove useful in the reflective examination of teaching and learning in various disciplines.

References

Becher, T. (1989) Academic tribes and territories: Intellectual enquiry and the cultures of disciplines. Milton Keynes: Open University Press.

Benwell, B. (1996) The discourse of university tutorials. Unpublished Ph.D. thesis, University of Nottingham.

Brown, G. and G. Yule (1983) Discourse analysis. Cambridge: Cambridge University Press.

de Beaugrande, R. and W.U. Dressler (1981) Introduction to text linguistics. London: Longman.

de Capua, A. and J. Dunham (1993) Strategies in the discourse of advice. *Journal of Pragmatics* 20: 103-125.

Eagleton, T. (1983) Literary theory: An introduction. Oxford: Blackwell.

Eggins, S. and D. Slade (1997) Analysing casual conversation. London: Cassell.

Guy, J.M. and I. Small (1991) Politics and value in English studies: A discipline in crisis? Cambridge: Cambridge University Press.

Halliday, M.A.K. and R. Hasan (1976) Cohesion in English. London: Longman.

Halliday, M.A.K. and R. Hasan (1989 2nd ed.) Language, context and text. Oxford: Oxford University Press.

Halliday, M.A.K. (1985) An introduction to functional grammar. London: Arnold.

Hoey, M. (1981) On the surface of discourse. London: Allen and Unwin.

House-Edmonson, J. (1982) Conversational strategies in German and English dialogues. In G. Nickel and D. Nehls (eds.), *Error analysis, contrastive linguistics and second language learning*. Heidelberg: J. Groos, pp. 135-150.

Jordan, M.P. (1992) An integrated three-pronged analysis of a fund-raising letter. In W.C. Mann and S. Thompson (eds.), *Discourse description: Diverse linguistic analyses of a fund-raising text*. Amsterdam/ Philadelphia: John Benjamins Publishing Company, pp. 171-226.

Keenan, E.O. and B. Schieffelin (1976) Topic as a discourse notion. In C.N. Lin (ed.), *Subject and Topic*. New York: Academic Press, pp. 335-384.

Lakoff, R. and D. Tannen (1984) Conversational strategy and metastrategy in a pragmatic theory, the example of *Scenes from a Marriage. Semiotica* 49.3-4: 323-346.

Lemke, J.L. (1982) Talking physics. Physics Education 17: 263-267.

Longacre, R.E. (1992) The discourse strategy of an appeals letter. In W.C. Mann and S. Thompson (eds.), *Discourse description: Diverse linguistic analyses of a fund-raising text*. Amsterdam/Philadelphia: John Benjamins Publishing Company, pp. 109-130.

Mann, W.C. and S. Thompson (1985) Assertions from discourse structure. Proceedings from the *Eleventh* Annual Meeting of the Berkeley Linguistics Society. Berkeley, CA: Berkeley Linguistics Society (pp. 245-

258).

Mann, W.C. and S. Thompson (1986) Relational propositions in discourse. Discourse Processes 9.1: 57-90.

Mann, W.C. and S. Thompson (eds.) (1992) Discourse description: Diverse linguistic analyses of a fundraising text. Amsterdam/Philadelphia: John Benjamins Publishing Company.

Mann, W.C., M.I.M. Matthiessen and S. Thompson (1992) Rhetorical structure theory and text analysis. In W.C. Mann and S.Thompson (eds.), *Discourse description: Diverse linguistic analyses of a fund-raising text.* Amsterdam/Philadelphia: John Benjamins Publishing Company.

Martin, J.R. (1992) English text: System and structure. Amsterdam/Philadelphia: John Benjamins Publishing Company.

Mercer, N. (1995) *The guided construction of knowledge: Talk amongst teachers and learners*. Clevedon: Multilingual Matters.

Meyer, B.J.F (1992) An analysis of a plea for money. In W.C. Mann and S. Thompson (eds.), *Discourse description: Diverse linguistic analyses of a fund-raising text*. Amsterdam/Philadelphia: John Benjamins Publishing Company, pp. 79-108.

Miall, D.S. (1989) Welcome the crisis! Rethinking learning methods in English studies. *Studies in Higher Education* 14.1: 69-81.

Ogborn, J. (ed.) (1977) *Small group teaching in undergraduate science*. Higher Education Learning Project (Physics). Heinemann: London.

Phillips, T. (1992) Why? The neglected question in planning for small group discussion. In K. Norman (ed.), *Thinking voices: The work of the national oracy project*. London: Hodder and Stoughton, pp. 148-155.

Popper, K. (1974- orig. 1934) The logic of scientific discovery. London: Hutchison

Rogers, G.F.C. (1983) The nature of engineering: A philosophy of technology. London: Macmillan Press.

Rowell, J.A. and E.R. Cawthorn (1982) Images of science: An empirical study. *European Journal of Science Education* 4.1: 79-94.

Sacks, H. and E.A. Schegloff (1973) Opening up closings. Semiotica 8.4: 289-327.

Schwab, J.L. (1964) Structure of the disciplines; meanings and significances. In G.W. Ford and L. Pugno (eds.), *The structure of knowledge and the curriculum*. Chicago: Rand McNally, pp. 6-30.

Sinclair, J. McH. and R.M. Coulthard (1975) Towards an analysis of discourse: The English used by teachers and pupils. London: Oxford University Press.

Stubbs, M. (1983) Discourse analysis: The sociolinguistic analysis of natural language. Oxford: Blackwell.

Testa, R. (1991) Negotiating stories: Strategic repair in Italian multi-party talk. Pragmatics 1.3: 345-370.

Tomlin, R., L. Forrest, M. Ming Pu and M. Hee Kim (1997) Discourse semantics. In T. van Dijk (ed.), Discourse as structure and process. London: Sage, pp. 63-111.

van Dijk, T.A. (1977) Text and context: Explorations in the semantics and pragmatics of discourse. London: Longman.

van Dijk, T.A. (1985) Handbook of discourse analysis. London: Academic Press.

van Dijk, T.A. (1997) Discourse as structure and process. London: Sage.

van Dijk, T.A. and W. Kintsch (1983) Strategies of discourse comprehension. New York: Academic Press.

Winter, E. (1982) Towards a contextual grammar of English: The clause and its place in the definition of sentence. London: Allen and Unwin.

Winter, E. (1994) Clause relations as information structure: Two basic text structures in English. In R.M. Coulthard (ed.), *Advances in written text analysis*. London: Routledge.