

METAPHORICAL USE OF LANGUAGE
IN EDUCATIONAL DISCOURSE:
A THEORETICAL AND EMPIRICAL INVESTIGATION

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ABSTRACT

This thesis investigates metaphor used by teachers and textbook writers, and the impact on children. The theoretical investigation clarifies definitions and descriptions of metaphor, to establish a valid, adequate framework for analysis of metaphor in ordinary, contextualised interaction. A "prosaics of metaphor" is developed, including metaphor identification procedures, a set of graded descriptors of metaphor, and interactional units of analysis to investigate metaphor in talk. Theoretical issues of the coherence of the category "prosaic metaphor", and the relation between prosaic and poetic metaphor, are discussed.

Two linked empirical investigations are centred around a ten year old child's discourse experience in a U.K. primary classroom. The first analyses transcribed talk, collected across several different lessons, for use of metaphor in relation to teaching/learning goals. Results include information on the frequency, distribution and nature of metaphor in use, and insights into how metaphor is signalled and supported in teacher-pupil interaction. Metaphor use is explained in terms of contextual demands, and the set of graded metaphor descriptors is refined. The second investigation uses a variation of Think Aloud methodology to explore understanding of metaphors in scientific texts. Analysis shows how knowledge brought to a text, selection of metaphors, the place of metaphor in text structure, and peer or adult mediation can influence understanding and learning.

The study reveals how metaphor choice can oversimplify concepts and skills which children need to acquire in the middle years of education. Interaction is shown as central in providing access to new ideas through metaphor. These results carry implications for textbook writers, teachers, and others who may mediate content through metaphor. The thesis contributes to the field of metaphor studies through links found between child and adult use of metaphor, and through the development of tools for analysing metaphor in interaction, which can be refined and extended to other discourse contexts.

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METAPHORICAL USE OF LANGUAGE IN EDUCATIONAL DISCOURSE

INTRODUCTION

Research aims

This study investigates metaphor in the language and cognitive development of children, with a particular focus on metaphor in the everyday discourse experience of the child within the institutional context of the school. It aims to develop a theoretical framework that can identify and describe metaphorical use of language in discourse involving children, and that can be used to explain how metaphor use may relate to understanding and to learning. Empirically, the study aims to investigate the use of metaphor in ordinary classroom events, and to investigate aspects of children's understanding of metaphor.

Why study metaphor?

A sociological perspective on the rise and fall, and the contemporary rise, of metaphor studies across the centuries since Aristotle's writings on metaphor as rhetoric would probably reveal dynamic links between intellectual currents and fascination with metaphor. It is instructive to reflect briefly on why the study of metaphor is currently so popular and on the nature of its current directions. The most obvious metaphors in language are those that, as in poetry, religion or politics, have a particular emotive power, or those that, as in science, make accessible the most complex and abstract ideas. Linguistics has generally been unsuccessful in attempts to include such metaphors in traditional theoretical frameworks, shunting them into the sidings of pragmatics or leaving them aside altogether as more relevant to literary studies. The post-modern, quantum-mechanic world seems to search out as relevant problems those that have previously seemed unanalysable, either because they were too complex for earlier explanatory mechanisms, or because they were ignored as not worthy of attention. So soap operas and advertisements become objects of academic research, and complex patterns of weather and economic systems become amenable to new mathematical descriptions. In tune with this *zeitgeist*, the linguistic study of metaphor has broadened to include uses of language that are less special but that might still be metaphorical, with this study carried out by philosophers of language, sociolinguists, cultural anthropologists and, to a lesser extent, applied linguists. Recent developments in prototype theory, cognitive psychology, cognitive linguistics and discourse analysis, influenced by developments in the wider scientific arena, have produced ways of thinking and modes of analysis that enable rigorous study of metaphorical language to be pushed

further than traditional linguistics allowed, to the extent that metaphor is often nowadays assigned a central and basic role in human thought and language. Metaphor achieves this centrality through being posited as the foremost way in which language expresses the making of mental connections, a basic process which in turn underlies categorisation and comprehension. The holistic conception of the nature and function of metaphor has been described as making use of our "basic imaginative capacity for integrating two or more disparate matters into a single novel meaning" (Polanyi and Prosch 1975:79), echoing Vygotsky:

Every thought tends to connect something with something else, to establish a relationship between things. (Vygotsky 1962:125)

Metaphor is currently seen as (re-)uniting reason and imagination, as being capable of emotive and cognitive power, and as perhaps underlying basic reasoning and language capacities.

An applied linguistic study of metaphor offers the opportunity to reassert the language dimension of metaphor alongside the current focus on the cognitive and the social. Very few metaphor researchers have investigated the effect of language form on the use of metaphor (major exceptions would be Brooke-Rose 1958; Steen, in press); even fewer have paid close attention to how metaphor functions in talk (Drew and Holt 1988, 1995 have studied a close phenomenon, idioms in conversation). Current work in corpus linguistics is beginning to yield important information about the language of metaphor use, such as the distribution of grammatical forms across multiple uses of conceptual metaphor (Deignan, in press), but there is still a large gap to be filled in researching how metaphor functions in interaction, as individuals draw on their language resources to make sense of each other's ideas (Lowe 1996).

Why study metaphor in education?

Claims that metaphor is central to the effective communication of complex ideas (Ortony 1975) and that metaphor can structure thought (Lakoff and Johnson 1980) clearly indicate the importance of studying metaphor in educational contexts. While children's use and comprehension of metaphor has been investigated (e.g. Winner 1988), research studies have only infrequently had educational aims. There have been quite rapid shifts in opinions as to how children develop their capacity to use metaphor, from a Piagetian view of it as a late developing skill, to more recent views that even infants use metaphor but that the nature of their metaphor use develops with their developing knowledge of

the world. However, there is still much to discover about how children use metaphor for communication and for understanding ideas at different ages. As with much first language research, a dichotomy is apparent between empirical paradigms employed with pre-school and those used with school-age children, resulting in a dearth of naturalistic studies or data on spontaneously produced metaphors by children of school age, and in limited information produced from experimental studies.

When we consider children in their school context, little is known, for example, about whether they can make sense of the metaphors that their teachers and text books employ, how they go about trying to interpret these metaphors, or what effect mediation by other people can have on understanding metaphor and understanding through metaphor. If we knew more about how children construct metaphors to help themselves understand, we might be able to develop and exploit this process for more effective learning. This study attempts to explore some of these issues of metaphor in educational discourse by focusing on the experience and processing of metaphorical language by individual children, identifying the types of metaphors that they encounter and how they make sense of them for communication and for learning. It aims for the detail that comes from a case study approach, together with the generation of developmentally adequate theoretical frameworks that can describe and explain that detail.

Outline of the chapters of the thesis

The thesis has two parts: the first, theoretical, part aims to clarify definitions and descriptions of "metaphor", so that a valid and adequate framework can be established for the analysis of metaphor in educational discourse, both spoken and written. The second part presents two linked empirical investigations into the use and understanding of metaphor in a particular classroom and from the perspective of an individual 10 year old child.

In the first chapter, I begin to set up a theoretical framework for analysis of metaphor in discourse, by starting from a traditional approach to metaphor as 'a figure of speech' or a figurative 'device', and identifying the limits of such an approach for an applied linguistic study concerned with metaphor in use. An alternative, 'prosaic' approach to the study of metaphor is developed, that can take account of the interactional, holistic and contextualised nature of metaphor in ordinary discourse. Clarification of the levels of representation and analysis with which the study is concerned leads to a key distinction between "linguistic metaphor" and "process metaphor". Current theories in complex

systems theory are drawn on to provide new ways of thinking about how metaphor may arise in talk in context.

Chapter 2 reviews, selectively, how metaphor, as an aspect of human language use, has been described and defined, moving from Aristotle to current cognitive theories of metaphor. The chapter concludes with a review of the literature on children's metaphor production and understanding, and a restatement of the theoretical research problem.

In Chapter 3, I demonstrate that a definition of metaphor in use through necessary and sufficient conditions is both inappropriate and impossible to construct, and instead adopt a preference-condition approach, in which features of metaphor are described in terms of whether they are necessary, graded or typical. Identification procedures require preference conditions to be supplemented with boundary conditions on the category "metaphor". For the purposes of the study, a descriptive framework needs to be dynamic as well as static, able to describe processing demands and mechanisms, and to be sufficiently cognitive in orientation to be applicable to the development of children's facility with aspects of metaphor. Investigation of the possible syntactic structures of metaphors in their linguistic context is carried out in the second part of Chapter 3 to establish a grammatical framework for metaphor. This detailed descriptive framework is evaluated against sample metaphors, and shown to be adequate. It is further evaluated after data analysis, in the light of its performance as an analytic tool.

In Chapter 4, I move to the empirical part of the thesis, which reports two investigations exploring first how metaphor is used in teacher-led talk in a Year 5/6 classroom, and secondly how metaphor found in text is interpreted by pupils. Chapter 4 presents a review of the literature on teacher and pupil use of metaphor, and sets out the procedures for data collection and analysis for the first investigation.

Chapter 5 reports the results of the analysis of the corpus of classroom discourse collected for the first investigation. Metaphors are shown being used for various pedagogic and interpersonal goals, and patterns are found in talk around metaphor that suggest support for understanding is an integral and important part of metaphor use in interaction.

Chapter 6 discusses the results of the first empirical investigation, in particular focusing on the use of metaphor in classroom interaction. Implications of the results, and of the

boundary decisions made in analysis of the data, for a theory of metaphor in use are considered.

In Chapter 7, I move to the second empirical investigation, into how children make sense of the metaphors they encounter. This chapter begins by reviewing briefly the literature on metaphor and learning, and then sets out the research questions addressed by the investigation. A new variant on Think Aloud methodology is described and defended as a valid tool for use in research with children.

Chapters 8 and 9 report the Think Aloud results from children working with two information texts. In Chapter 9, the full results of the second investigation are discussed, in terms of the processing strategies children use to make sense of metaphors, how they draw on previous knowledge, and the role of mediation of, and through, metaphor by adults or peers. Analysis of breakdowns in understanding contributes to the development of a set of implications for text book writers and teachers who use metaphor.

The final chapter pulls together the theoretical and empirical results to discuss implications for metaphor theory, for education and for further research.

Major themes of the study

This introduction concludes with a preview of major themes that will recur throughout the study and that are important for applied linguistics and for educational discourse.

We will find that the question of whether or not metaphor is a special type or use of language cannot be answered *per se*. Instead, from a discourse perspective, there is a need to identify the features of metaphor that give it the potential to be special and the conditions under which this potential is realised. In this process of identification, the continuity of metaphor with other phenomena becomes apparent again and again. There is continuity in cognitive power with analogy and comparison; in communication, there is continuity with the use of other voices or of other striking lexical choices; in form, there is continuity with similes and with elliptic forms; in the use of lexis, there is continuity with the flexibility of delexical verbs and prepositions. We should not perhaps be surprised by this, but the classification procedures of the discipline accustom us to focus on differences and boundaries rather than on similarities and continuities. Metaphor provides a healthy challenge to the order and precision researchers in applied linguistics seem often to feel obliged to demonstrate in their data analyses.

Another major theme is the nature of communicative risk involved in everyday language choices. Metaphorical uses of language are often held to be balancing precariously between cognitive clarification and confusion; between interactive effectiveness and destructively heavy processing demands. While this may be true of other types of language too, the "unfinalizability" (Morson and Emerson 1990:36) of metaphor, the creativity made possible by particular choices of the metaphor terms, suggests it should be a paradigm example (Goatly 1997). In educational discourse, the risk of ineffective communication is highly salient since it can threaten children's learning opportunities, and the theme of risk and risk management is addressed throughout the study.

This thesis takes an applied linguistic approach to researching metaphor, and includes detailed development of what such an approach might mean. That development will lead me to suggest that 'prosaic metaphor' - metaphor in use in everyday discourse - is a phenomenon distinct from poetic metaphor, in need of its own theory and analytic tools. I attempt, as the thesis proceeds, to develop theory and methodology that is both appropriate and adequate for researching metaphor in educational discourse.

CHAPTER 1

THEORETICAL BACKGROUND: A PROSAICS OF METAPHOR

1.1 A prosaics of metaphor: Introduction

This thesis reflects a search for coherence, in description and in explanation, across a series of investigations of metaphor use in real-life educational situations. This chapter begins the theoretical task of setting up a multi-dimensional framework to identify and describe metaphor in discourse, which can be used in the empirical investigations.

The approach taken in this thesis to the identification and analysis of metaphor is labelled "prosaic" to reflect my concern with investigating the ordinary and the interactional. The term *prosaics* was coined by Morson and Emerson in an attempt to encapsulate the concern of the Bakhtin circle with non-abstracted and everyday language and events:

Prosaics encompasses two related, but distinct, concepts. First, as opposed to 'poetics', prosaics designates a theory of literature that privileges prose in general and the novel in particular over the poetic genres. Prosaics in the second sense is far broader than theory of literature: it is a form of thinking that presumes the importance of the everyday, the ordinary, the 'prosaic'.

(Morson and Emerson 1990:15)

It is this second sense of prosaics that is adopted in the thesis. A prosaics of metaphor is concerned with metaphor in everyday language use.

Bakhtin rejected the Saussurean abstraction of language from context, that leaves aside instances of talk (*parole*) in order to study and systematise decontextualised language (*langue*) (Bakhtin 1981). He believed that, in the process of abstraction, essential aspects of "the original cultural process .. their 'eventness'" was lost (Morson and Emerson 1990:39). The prosaic for Bakhtin is the site of linguistic creativity; creative acts take place in ordinary events working with the raw material of the everyday, not just in the special exceptional events that are labelled 'creative'.

A prosaic perspective seems particularly appropriate to this study, as a way of reasserting the importance of everyday metaphor. Traditionally, the label 'metaphor' has been applied to exceptional and special metaphorical uses of language, in poetry, drama and rhetoric. Recent emphasis, especially in cognitive linguistics (reviewed in detail in Chapter 2) has shifted metaphor to the realm of ordinary uses of language, which may often pass unnoticed. The continuity of metaphor with other uses of language is one of

the themes running through this study, although I reserve judgement at this point as to whether some types of metaphor might be better considered as discontinuous from ordinary language uses, separated by sudden increase in processing demands, rather as mathematical Catastrophe Theory shows steady change producing sudden dramatic effects. It may be, as Ortony suggests, "Metaphors stretch language beyond its elastic limit" (Ortony 1993:355).

Bakhtin holds special acts of creativity to be "extensions and developments of the sorts of activities we perform all the time" (Morson and Emerson 1990:187); relevance theory, developed by Sperber and Wilson, holds metaphor to be, similarly, "*simply* creative exploitations of a perfectly general dimension of language use" (Sperber and Wilson 1986:237, my italics). A concern with the everyday and the ordinary in language use does not, however, as Sperber and Wilson seem to suggest, lead to the simple, but rather to the complex. Bakhtin's focus on the prosaic and on heteroglossia, the many different forces on language use (Bakhtin 1981), projects the complex as normal, and the simple as unusual, the result of labour, and as therefore deserving of explanation (Morson and Emerson 1990:31). He warns of the difficulty of trying to study everyday events, and at the same time of the importance of doing so:

A model of language .. is nothing unless it can help us appreciate the overlooked richness, complexity, and power of the most intimate and the most ordinary exchanges. (Morson and Emerson 1990:34)

This study takes a prosaic approach to investigating metaphor, tackling the difficult theoretical issues generated in relation to identifying and categorising metaphor, and producing a descriptive framework that can be applied to all types of metaphor in discourse.

As a first step in providing this theoretical background for a prosaics of metaphor, I assess the adequacy of an initial, traditional, definition of metaphor as a figurative device against examples of metaphorical language in the school context, thereby demonstrating some of the theoretical complexities of metaphor in discourse which need to be addressed. Consideration of these complexities leads to the need to move beyond defining metaphor as device, and towards defining it as a particular kind of use of language. A central distinction is made between uses of language that have the potential to be metaphorical and those uses for which there is actual evidence of metaphoricity. I then develop the argument that a prosaic approach to metaphor must also take account of the interactional, holistic and contextualised nature of metaphor in use, and later

sections of the chapter begin to develop the research implications of these theoretical requirements. In the final section of the chapter, current developments in complex systems theory are briefly reviewed in order to extract key perspectives that can contribute to the development of a prosaics of metaphor.

1.2 An initial definition of metaphor

I take as a starting point in the defining process, the following general statement:

Metaphor is a device for seeing something in terms of something else.

(Burke 1945:503)

This rather vague description of metaphor as a figurative device often seems to be the only level at which theorists and researchers of different persuasions can agree, and similar 'definitions' can be found in many key publications (e.g. Kittay 1987; Black 1979; Gibbs 1994; Lakoff and Johnson 1980). Once past this level of generality, disagreement rapidly develops. The theoretical chapters of the thesis will include a review of this disagreement over definition, and an attempt to create order in the area in which I shall be working. Meanwhile, I make use of Burke's description of metaphor as figurative, with its useful ambiguity as to whether the "device" is verbal, cognitive, or both. The key feature of the device is its action: "*seeing ... in terms of ...*". In other words, the cognitive essence of metaphor appears to lie in its dynamic potential for altering understanding. As I shall argue in later sections, in a prosaic approach, the long-running debate as to whether metaphor is a phenomenon of language or of thought appears somewhat misguided. For this study, the interplay of metaphor in language and thought is of central importance, and I shall suggest that metaphor in discourse essentially involves both language and thought.

In describing the components of a metaphor, I call the first "*something*" the Topic, and the "*something else*" is labelled the Vehicle. These terms derive from Richards (1936) and Perrine (1971), and, despite Black's alternative suggestion of "primary subject" and "secondary subject" (Black 1979:28), have become more or less conventional, .

The definition of metaphor as figurative device uses the term 'metaphor' to refer to an uncountable, abstract process, and does not immediately help to decide whether a particular stretch of language can be labelled 'a metaphor'. This terminological issue includes a process / product distinction (Gibbs 1994), but is more, and more subtle, than that. A definition is needed that will identify instances of 'metaphor' in discourse, and, further, that will identify all instances of metaphor. From Burke's description of metaphor as device, 'a metaphor' can be taken as an output of the figurative device. Identifying

metaphor in discourse would therefore rely on being able to infer from a surface manifestation that the device "metaphor" been used to produce the language. In this approach, metaphor use is assumed to be intentional.

A further issue for the theoretical task of metaphor identification also opens up: will the potential, of *seeing something in terms of something else*, have to be realised in order to for a metaphor to be identified? To use an analogy, a cannon is a device for firing cannon balls at an enemy in a battle, but it is possible to identify a cannon by its shape, structure and potential, without needing to see it in action. How far is this to be the case with metaphor as device?

There is clearly much work to be done in moving from an initial definition of metaphor as device (M-D) to an operational definition of prosaic metaphor in discourse, with the issues of intentionality and metaphorical potential already in need of resolution. Metaphor as device, however, provides a useful interim 'definition' and, in the next section, testing it out for adequacy against examples of classroom discourse will raise additional problems, the clarification of which will take us further towards theoretical framework for a prosaic approach to metaphor. Figure 1.1 summarises the notion of Metaphor as Device, and implications of this approach to metaphor.

Figure 1.1 Summary of implications of defining metaphor as "device"

METAPHOR AS DEVICE (M-D)

Starting point (process)

metaphor (M-D) IS SOME KIND OF device available to language users

Implications:

metaphor is intentionally employed in language use

metaphor involves skill or capacity that can be developed, and is not necessarily innate

metaphor can be separated from use and from users in theoretical discussions

M-D in discourse (product)

"*a metaphor*" refers to a stretch of language that is the outcome, or output, of using the device *metaphor*.

1.3 Metaphor in the educational context of this study

In this section, examples from classroom discourse are put forward as candidates for the category 'metaphor', and serve to illustrate definitional dilemmas that must be resolved before empirical investigations can be carried out. The examples show candidate

metaphors being used in communication, to help convey abstract and complex ideas in the classroom situation, where interaction between teacher, text and children is a socialising as well as a pedagogic process. In quoting examples from data, I use *italics* to indicate verbatim expressions, and ***bold italics*** to indicate candidates for the label of metaphor Vehicle.

1.3.1 Examples of metaphor in children's language experience in school

When I arrived on my first visit to the primary school where I was to collect data, the Year 5 /6 children were sitting in a horseshoe, listening to a religious assembly broadcast on BBC radio. They heard a story about street children in Brazil being provided with shelter, security and education, and then sang a hymn with the lines

peace like a river / flows through my soul.

This metaphor was presumably designed to help understanding of an abstract concept, (feeling) *peace* through linking it to, and in some way 'seeing it as', something familiar, (flowing of) *a river*. The Metaphor as Device approach can deal unproblematically with this as 'metaphor' as outcome, since the inferencing of intentional use of the device of metaphor would be acceptable.

The teacher then led a discussion on why a story about Brazilian street children might be suitable for Easter time:

it's about new life, suggested one girl, linking the two situations at a general and abstract level. The teacher, in order to help the children make a link between Easter and this story, reminded them that:

Jesus conquered death.

Here an abstract verb *conquered* was used to convey an abstract theological idea - resurrection (lexicalised by the child as *new life*) - which was in turn metaphorically represented by a story from Brazil told within the 'school assembly' discourse. The demands made on the children in the interpretation of these metaphors work on several linguistic and cognitive levels, but the Metaphor as Device approach is still adequate to the task of describing and explaining what is happening.

However, further examples of language use in the classroom show the M-D approach reaching its limits in the identification of metaphor in discourse. In one corner of the classroom, the computer bore a notice written by a child:

This printer is playing up.

When I asked what this meant, it was explained:

When you try to work on it, it goes mad.

Uses of terms like *playing up*, *goes mad* sound like 'metaphor', but justifying them as unquestionable outcomes of the use of the device 'metaphor' (M-D) would be tricky. Does the use of these terms imply that the computer is to be "seen as" in some way self-determining or possessing mental states? Other uses of language seemed even less clearly categorisable as metaphor (M-D), although having some features in common with metaphorical language at the level of underlying thought. For example, as the morning in school progressed, the teacher organised the class into group work and addressed a group of children, metonymically, in terms of the furniture they were using:

Table 1, I want you to ...

The group of children in question clearly knew that they were the referent of *Table 1*, and so, in some ways, both they and the teacher 'saw' them 'in terms of' where they were sitting. In Maths work, pupils made triangles out of art straws bent at the corners, raising the question of whether a triangle that is 3-dimensional rather than 2-dimensional, with curved corners rather than angles, can be said to be, in some sense, a 'metaphorical triangle'. There is a flexibility of conceptualisation, reminiscent, at least, of metaphor, in assigning the single label *triangle* to these straw triangles, to triangles made by drawing lines on a page, and to triangles that are solid plastic shapes. If we stretch language and word reference all the time, then at what point does stretching become metaphor?

Spontaneous production of metaphor-like language, was observed in both teacher and pupils. As the children wrote their compositions, the teacher urged them to think carefully about their style and choice of words:

Visualise it ... like a monitor screen in your mind's eye.

One boy wrote about a football match

the teshun (sic) was as great as Indianapolis

A discourse approach to metaphor is also concerned with the communicative effect of selecting particular lexical items rather than other, more literal, or more metaphorical, ones. While the choice of *Indianapolis* produced a meaningful comparison for the pupil, to me this Vehicle term was unknown, and the chosen "device" was rendered ineffective.

Metaphor as Device begins, then, to seem inadequate to deal with the identification of metaphor in discourse; as a top-down approach, working from the abstract to the concrete, it has difficulties when required to work bottom-up, from examples of language in use. However, the difficulties experienced in trying to apply a figurative device approach to metaphor can assist the process of setting up theory that will produce identificational criteria applicable to discourse data. Implications are developed in the next sub-section.

1.3.2 Implications for a prosaic approach to metaphor in discourse

Gaps between intention and understanding metaphor

The metaphors I heard in the classroom were often used with a cognitive function, or at least with cognitive intent, but the nature of children's interpretations, and how closely they matched the intended meanings of producers, could not be ascertained from observation; it was not possible to probe thought processes under the surface of language to any depth. With metaphor, as with any other language use, processing may result in appropriate or inappropriate understandings. Perhaps though, as with *Indianapolis*, metaphor increases the risk of misunderstanding, through the very process of offering another perspective from which to "see" the Topic. To what extent, I wondered, did all the children manage to understand the intended messages in the assembly on the theme of street children and new life, at the levels of sentence, story and discourse? In terms of the transmission of values and attitudes, to what extent would they see the links and implications of the metaphors as open to question? Would the metaphors of religious discourse be received in the same way, and have a similar influence on their growing understanding of the world, as the metaphors of science?

The converse of misunderstood metaphors would be the unintended metaphorical interpretation of language used non-metaphorically by a speaker, in which the receiver identifies an unintended "*something else*" in an utterance, and uses it as an interpretational device for making sense of other content, even though it was not intended as such. I became aware that inappropriately metaphorical interpretations may not be uncommon through interaction with my son, who, through discussions with me and with the metalinguistic precociousness characteristic of children of applied linguists, had begun to acquire the label 'metaphor' before he was seven years old. He used the term to bring possible metaphors to my attention, and one day told me:

Weather men use metaphors.

When they say there will be a hot spell

... like a witch's spell

(Child aged 7;9. Author's data)

The child here inappropriately interprets *spells* as coming from a semantic field in some way distinct from that of *weather*, and makes sense of what he hears using a metaphorical interpretation strategy. The interpretation arrived at was not, presumably, that intended by the speaker. As far as I am aware, the extent to which metaphorical interpretation is a commonly used operating strategy in language processing has not been investigated.

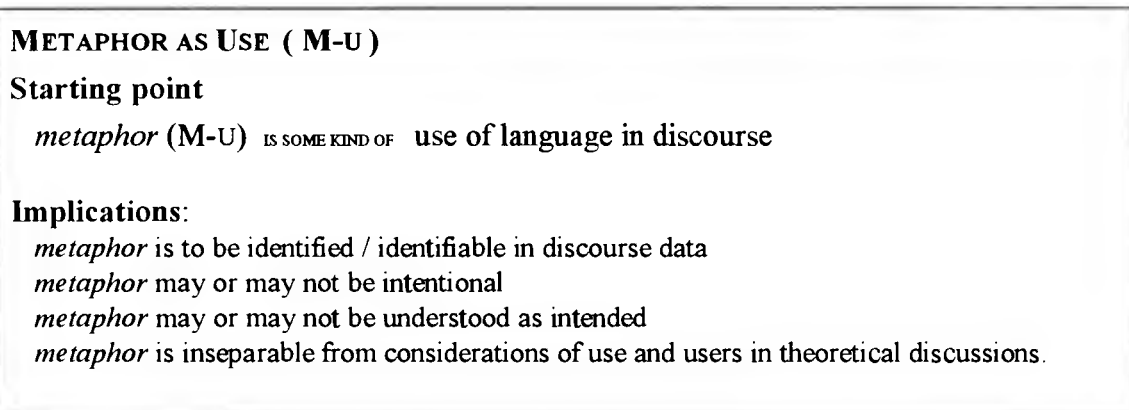
Misinterpretations can thus occur through complete or partial understanding of metaphor, or through inappropriate assumption of metaphorical intention. We may wonder about the cognitive, and social, consequences of such misinterpretations. What happens when a metaphor carries an important scientific or abstract idea, like the pumping of the heart? *like a foot pump* said the same child, drawing on his recent experience and observation, *it goes in and out*. The limitations of observation discussed above highlight the need to find adequate ways of accessing children's processes of recognition and interpretation, and, in the second empirical investigation in this study, I have adapted Think-Aloud techniques for child participants. For a theory of metaphor, the phenomenon of partial or inappropriate interpretations of metaphor evident in these examples hints at an underlying problem that will need to be tackled; metaphoricity in practice is not fixed, but can be relative, depending on contextual factors and background knowledge of the receiver. Furthermore, a researcher's decisions as to what is, and is not, counted as metaphor will always be open to criticisms from others who may not agree with the researcher's boundaries of metaphor. There is no 'right' decision, and the researcher must take precautions to avoid this "but it's not a metaphor for me" syndrome. The outcomes of identification procedures for metaphor are likely always to be open to objection, raised by simply adjusting the assumed receiver of the metaphor. A theoretical framework must counteract this vulnerability by including explicit statements about assumed receiver(s).

Metaphor as use

The example of the *witch's spells* serves to emphasise that metaphor can be seen not just as a phenomenon of language, but also as a feature of language in use. The word *spells* can be considered as a metaphor Vehicle to the extent that it can be considered to be used metaphorically, in this instance in reception. For the child, it became a metaphor in its interpretation, although it was not intended as a metaphor by the original speaker. This holds similarly for the intentional metaphors encountered in the classroom: *river* as a word or as an idea is not in any way essentially metaphorical. It is used metaphorically, in production, when brought into the school assembly discourse to refer to *peace*. Metaphor cannot be identified in the same way as a cannon (Section 1.2), whose shape and structure generates its potential, since there need be nothing about the shape or structure of a stretch of language *per se* that will predict metaphorical potential. Metaphorical potential will need to be identified by considering a stretch of language relative to users and within its discourse context.

A prosaic approach requires that metaphor be analysed in terms of use. I thus move from a top-down, process, approach (Metaphor as Device) to a bottom-up, product + process approach (Metaphor as Use). In this move, the category labelled by the term 'metaphor' also shifts, and it is important to be very clear that the new referent is not an abstract device but a concrete stretch of language. A Metaphor as Use (M-U) approach does not try to investigate only a theoretical construct put into use, but will also work from use to construct a theory of metaphor in use. In the (M-U) approach, the intentionality requirement is lifted, and replaced by metaphorical potential; a stretch of language is a metaphor if it has the potential to be interpreted as a metaphorical use of language. It then becomes necessary to define this "potential to be interpreted as a metaphorical use of language". The achievement of metaphorical potential, i.e. metaphorical interpretation, then becomes a further, empirical, issue. Figure 1.2 summarises these initial implications of taking metaphor as use (M-U):

Figure 1.2 Summary of implications of defining metaphor as use



A Metaphor as Use (M-U) approach is then what needs to be developed for a prosaics of metaphor. The basic unit of a prosaics of metaphor is the metaphor (M-U); this will also be called prosaic metaphor. The next section begins the task of defining and delimiting this unit.

1.4 Linguistic Metaphor and Process Metaphor

The distinction established in the previous section between metaphorical potential and achievement of that potential leads to what is, I suggest, a key distinction for an empirical study of metaphor in prosaic discourse. The identification of metaphorical potential is a theoretical exercise, in the sense that a researcher faced with discourse data draws on a pre-established set of criteria to identify stretches of language that have the possibility of being interpreted metaphorically. (I assume that identification criteria will

be designed to include stretches of language that were deliberately produced metaphorically.) Not all the stretches of language thus identified as potentially metaphorical will in fact be received metaphorically, and further work will be needed by a researcher who wishes to establish which stretches of language are, in practice, processed as metaphor. Furthermore, as with *hot spells*, it may be that this second identification exercise identifies stretches of language that were not initially identified as having metaphorical potential, but yet were processed metaphorically. I thus distinguish between two kinds of prosaic metaphor:

- ≈ **Linguistic Metaphors:** stretches of language identified as having metaphorical potential and
- ≈ **Process Metaphors:** stretches of language identified as being processed metaphorically.

The term "linguistic metaphor" is used in a similar way, although in a poetic / device approach rather than in a prosaic approach, by Steen, who follows Lakoff and Johnson (1980) in employing the term to contrast with "conceptual metaphor" (Steen 1992:102). "process metaphors" have also been labelled "psychological metaphors" (Steen 1992:104) and "novel or original figures" (Pollio and Pickens 1980:312). The distinction is thus not a new one, but for a prosaics of metaphor it has, I contend, a degree of importance underplayed by other studies to date.

This is not, of course, a definition, but a distinction between two levels of analysis: the first, a theoretical level, and, the second, a conceptual-processing level (Marr 1982). The level at which metaphoricity is determined will influence the evidence required for metaphoricity, and the type of data that will count as evidence. A third level, the neurological, can also be distinguished, at which evidence would be in terms of neural activity. This level is not relevant to the work in this thesis, and is not further referred to. Clarification of the distinction between theoretical and conceptual-processing levels will help in the critical evaluation of existing theories of metaphor. Theoretical and empirical work carried out at each level should, as far as possible, be congruent with what is known about other levels, and the validity of theory-level accounts of metaphor can be evaluated by how far they take adequate account of what is known about processing, and vice versa. This demand for congruence will assist in the task of the next chapter, of sifting the enormous amount of work in metaphor studies to extract that which is relevant to empirical discourse-based investigations.

The tasks of a researcher into metaphor in discourse can now be restated more clearly, as including the need to establish:

- theory-level criteria to identify linguistic metaphor
- a model of the use of linguistic metaphor in discourse
- a model of the discourse processing of linguistic and process metaphors
- processing-level criteria to identify process metaphor

The review of metaphor studies literature in the next chapter will further address these tasks. Meanwhile, the notion of metaphor as device will give us a starting point to answer the key question - which uses of language will count as metaphorical uses, and thus as linguistic metaphor? I will take as a baseline, stretches of language that look like metaphor defined as device, and try to extract key identifying features for the new category *prosaic (linguistic) metaphor*. The most easily identifiable feature is the 'something else' that is added to provide other ways of seeing or understanding, also labelled the Vehicle term. It is the presence of a possible Vehicle term in a stretch of discourse that will provide an initial indication of the presence of something that might be classified as metaphor: i.e. anomaly or incongruity acts as a necessary condition for metaphoricity. The anomaly or incongruity has to be relative to the discourse context in which it is sited, and the next section deals with how features of discourse context can be accounted for in establishing criteria for metaphoricity.

1.5 Metaphor as use: Implications of a prosaic approach

The particular discourse approach to metaphor developed in this study has, as central object of concern, contextualised interaction between individuals, and, from this base, follow certain key characteristics, with implications for the study of metaphor as use.

A prosaic approach to metaphor as use requires a theoretical framework that takes account of

- the interactional nature of discourse
- links between language, thought and the socio-cultural in discourse
- the inseparability of discourse and context

Implications of each of these issues are developed for the study of metaphor in the sub-sections that follow and brought together in the section summary.

1.5.1 Interaction and prosaic metaphor

Interaction, or dialogic use of language (Bakhtin 1981), is seen as the norm for a prosaic perspective; non-interactive 'text' is generally either an abstracted product of interaction or is covertly interactional (e.g. a text in a book was written through some kind of mental

interaction between writer and imagined reader). An interactional approach to metaphor requires analysis of metaphor in on-going discourse that takes account of what has been said in the immediately preceding talk, how metaphor fits into talk between individuals, and what happens in the talk after the use of metaphor.

Metaphor is language used metaphorically, where 'use' can apply to any aspect of interaction: producing, understanding, sharing ideas. The holism of the prosaic approach adopted in this study tries to go beyond considering discourse as the sum of discrete, individual contributions to considering it as the joint construction of the individuals concerned, where what is 'constructed' is more than the sum of parts. Such an approach is broadly consonant with a view of discourse as text together with the context(s) of production and reception (e.g. Steen 1994, Fairclough 1990), with Bakhtin's rich notion of "dialogue" (Morson and Emerson 1990), and, most closely, with H.Clark's recently published approach to language use as "joint action" (Clark 1996:3). Analysis of language in use cannot separately analyse production, reception and understanding, nor separate processes from products, but holds these as integrated and inter-related in the "joint projects" that comprise interaction (Clark 1996:150). Where analysis requires the separation of production and understanding, as in the empirical investigations included in this thesis, research methods and tools should allow for results to be interpreted as complementary. I will also work with the principle, taken from Conversation Analysis, that, wherever possible, inferences made about understanding or purposes should be directly justifiable from evidence found in the interaction itself (Edwards 1997).

The interactional perspective of language in use takes use by interacting individuals as primary, and sees "a language" such as English or French, as emerging (see 1.6.2 below) from the use of language, over time, by multiple groupings of individuals interacting under particular macro-level constraints, such as geography and opportunity to travel. Metaphor in interaction between individuals is also taken as (theoretically) prior to metaphor in a language. Theory which explains metaphor in use by individual native-speakers of English should be able to be extended to explain metaphor in "English". The primary concern in this study however is with metaphor use by individuals, in interaction, in context.

1.5.2 Language, thought, the socio-cultural, and prosaic metaphor

This study aims to reveal and understand the use of metaphor "on the surface of discourse" (Hoey 1983), together with something of the underlying processes of metaphor use, so that more can be understood of how children and adults connect

language use, thought and action. For this type of applied linguistic theory and research, the linguistic is tied into the social and the cognitive, and, I would argue further, these three strands are inextricably and inseparably related. As Clark (1996) argues, if we take a purely cognitive approach or a purely socio-cultural approach to language use, and, by extension, to an aspect of language use such as metaphor, we do not get pictures that are differently but equally valid; rather, we get partial and inaccurate pictures, since it is precisely the interaction between the cognitive and social in language use that produces the language and behaviour we observe and research. Instead, a view of language in use is needed which prevents a one-sided or compartmentalised approach, by allowing the social and cognitive to be integral parts of theory and analysis, rather than add-ons. This should then allow the holistic investigation of the impact of metaphor on individuals in interaction.

In terms of analytic tools, this holistic perspective suggests drawing on concepts from both pragmatics and semantics where appropriate, and combining methods developed in a range of fields, including conversation analysis and discourse analysis. I will not be looking to analyse talk by only breaking it down into hierarchies of levels, each constitutive of the one above, but also by analysing it simultaneously from several perspectives, which can be re-combined to shed light on, for example, how grammatical forms of metaphor are set into talk in ways which help develop shared understanding in pursuit of pedagogical aims.

1.5.3 Context and prosaic metaphor

Establishing the role of context in discourse is a particular aspect of a holistic approach to language in use. The basic predicate is that "language in use" cannot be separated from the context of use for analysis or empirical investigation, without it becoming something essentially different. This view is increasingly current in applied linguistics:

Instead of viewing context as a set of variables that statically surround strips of talk, context and talk are now argued to stand in a mutually reflexive relationship to each other, with talk, and the interpretive work it generates, shaping context, as much as context shapes talk. (Goodwin and Duranti 1992:31)

An approach to interaction as context-bound is consonant with approaches to cognitive development that build on Vygotsky's work (Wertsch 1985; Rogoff 1990), and together these provide part of a useful analytic framework for analysis of metaphor in educational discourse. Rogoff uses Activity Theory (Leont'ev 1975) to set up the "contextual event" as a unit of analysis which cannot be reduced to the interaction of separate elements

(Rogoff 1990:27). Contextual events are seen as goal-directed (Rogoff 1990:29), i.e. organised according to the goals, or "motives" (Wertsch 1985: 204), of participants, with mental processes guiding action and interaction in the specific circumstances of the event towards the achieving of goals. I have argued elsewhere (Cameron 1996) that utterances in interaction can be considered as "operations" used to carry out "actions" in the "activity" or "event" (Wertsch 1985: 202-203). I will use the schema of event / action / operation to apply to discourse and interaction. While "operations" are individual utterances within which metaphor will be sited, "actions" are discourse units that are interactional or jointly performed, and the three levels of analysis are not hierarchical in the sense that they break down, one into another from higher to lower levels. The term "discourse event" is adopted, to mean the same as Rogoff's "contextual event", but with an emphasis on the use of language. The phrase also has useful echoes of the "speech event" (Hymes 1972) with its inherent social-group conventions in language use. The discourse event will serve as the contextual unit of analysis within which metaphorical uses of language are sited, and within which they can be analysed in terms of interaction, understanding and linguistic form. "Discourse event" is also helpful in that it will map on to "task" (Skehan 1994) as used in task-based approaches to language classroom activity, and therefore the framework developed here is transferable.

Activity Theory as a tool for applied linguists or cognitive psychologists is still being refined and continues to present problems in the high level of generality in many of its key ideas (Wertsch 1985); current work is attempting to pin down some of the more tenuous concepts (e.g. Lantolf and Appel 1994). The notion of "goals" seems particularly in need of concretising and operationalising; for example, the term "goal" can be interpreted as

- *conscious or sub-conscious*

The participants in events may deliberately try to achieve specific, known goals, as in a teacher-set learning task, or, goals may only be determined post-hoc, when the outcomes of an event are analysed.

- *broad or narrow*

Goals might be very broad e.g. to get more friendly with another person, or narrow and more task-related, e.g. to persuade the other person to lend you some money.

- *long or short term*

Goals may be layered and interdependent; so, for example, given a long term goal of buying a house, there may be interim goals to achieve of collecting information on houses for sale, or negotiating a mortgage. The long term goal influences the short term goals.

• *fixed or dynamic*

Goals that participants start with at the beginning of an interaction may change through negotiation in the course of the interaction.

Moreover, for any discourse event, an analyst could probably list many goals of different types, perhaps *infinitely* many. In these ways, the notion of 'goal' suffers the same problem as that of 'function' in language teaching and applied linguistics, and the researcher must constrain and specify the concept in order to operationalise it.

A preliminary step in operationalising the notion of motives and goals is to view a discourse event in terms of Clark's idea of an extended joint project (Clark 1996:206), which develops as a result of many, contingent minimal joint projects. In other words, the discourse event is constructed through the interplay of event-level motives with more local sequences of interactions which have their own local goals. Analysis of discourse events in terms of goals and purposes will then need to analyse event-level motives, local-level goals and the way they inter-relate, drawing evidence from the discourse interaction. I also take, as an underlying motive of any discourse, a search for mutual coherence or shared understanding. Making sense to, and of the ideas of, another person would seem to be a basic motivating force of language in use, and an integral part of more local goals or functions of discourse, such as persuading, transactional or expressive use of language, and is even necessary, at least in one direction, for deception. Complete shared understanding is, of course, an unattainable aim, analogous to achieving the perfectly "fit" species in the evolutionary process, and a continuing search for greater shared understanding contributes to the dynamics of interaction. In educational contexts, the motive of shared understanding also underlies other, pedagogic goals, such as increasing understanding of concepts or developing communication skills, and, when I analyse classroom discourse in later chapters, I develop a scheme of detailed pedagogic goals for talk so that use of metaphor can be linked to learning.

While goals of participants are seen as a key aspect of context, playing an important role in determining the course of the interaction, there are other essential aspects too. These can be grouped as *language-related* or as *participant-related*.

Language-related aspects of context

For the moment these will be simply divided into co-text and immediate linguistic context. The latter refers to the utterance in which metaphor is used; the former, to the rest of the interaction in the event. Language-related aspects of context will be closely defined in Chapter 3.

Participant-related aspects of context

These will include, as important for this study, the resources that participants bring to the interaction, processing constraints imposed by context, and the social-group relations between participants. Resources include

- the conceptual understandings of topics in, or related to, the talk
- skills in interaction and language use

Constraints on processing, as the application of resources, may derive from the situational context, e.g. noise, and from imposed goals, e.g. pressure to complete a task in a limited time.

Relations between participants will be affected by power, distance and solidarity (Fairclough 1990).

Resources, constraints and relations are **dynamic**, in that they may change as the interaction progresses.

Individuals in interaction will also be motivated by their own personal search for understanding of the talk and action they are involved in, and these intra-personal goals will overlap with the inter-personal goals discussed above. Meadows describes recently developed views that "an innate drive for 'coherence' and a high level cognitive mechanism for producing it are at the heart of human cognition" (Meadows 1993:72). Interestingly, this view comes from work with autistic children (e.g. Frith 1990), who are also found to have problems with making sense of metaphor (Todd 1996).

1.5.4 Implications of a prosaic approach: Summary

In summary, a prosaic approach will explore metaphor in use as embedded in discourse, which in turn is analysed as the outcome of individuals in contextualised interaction employing their particular linguistic and conceptual resources, to achieve particular interactional and transactional goals, under particular constraints of processing and of situation. This perspective on metaphor shapes the kind of questions that can be asked about metaphor and the methods used to find answers to those questions. Basic questions to investigate prosaic metaphor in discourse, educational or other, would include, I suggest:

How is prosaic metaphor used?

What does the use of prosaic metaphor achieve?

Why is prosaic metaphor employed?

The first question is descriptive; the second begins to move from description based firmly in interactional evidence towards consideration of goals and outcomes; the third question

requires a higher degree of inferencing and takes us into explanation. Answers to each question can be framed in terms of

1. **the ideational impact of metaphor:** how shared and / or individual understandings and mental representations are affected by the use of metaphor
2. **the interpersonal impact of metaphor:** how attitudes and values are affected by the use of metaphor, on an inter-individual level and / or on a broader socio-cultural group level
3. **the interactional impact of metaphor:** how the on-going discourse event is constructed and / or affected by the use of metaphor

The term "impact" is deliberately used to avoid the ambiguity of other, more common terms such as "function". Literature related to the impact of metaphor will be reviewed in Chapter 2, and the three types of impact identified above will be used in the empirical investigations into classroom discourse.

1.6 Prosaic metaphor and complex systems theory

The final section of this chapter draws on recent developments in the natural sciences to help develop, at a macro level, the integrated epistemological / theoretical framework required to deal holistically with the prosaic metaphorical use of language in the dynamics of contextualised interaction. I am not alone in finding the existing tools of applied linguistics inadequate; across the discipline there are symptoms of a search for a new paradigm. Recent conference papers and articles in key journals have expressed disappointment with the traditional reductionist scientific paradigm, and have tried out other possibilities for underlying perspectives (Block 1996; Lantolf 1996; Rampton 1995), while those working happily within the traditional scientific paradigm, for example within SLA, still defend their values and results. In these debates, the changes taking place within science, and the paradigm shifts being experienced in mathematics, biology and physics seem to have gone largely unmentioned. In fact, the debates within science demonstrate some of the same worries that concern applied linguists: how to take account of context, how to work with non-simple, non-linear systems without neglecting or underestimating key factors, how to explain similar phenomena with apparently disparate causes.

The theory of complex systems, which has been developing rapidly over the last 10-15 years, seems to offer a way forward. Complex systems theory now brings together Chaos Theory, Catastrophe Theory and Complexity Theory, with particularly exciting applications developing in evolutionary biology (e.g. Casti 1994; Cohen and Stewart

1994; Kauffman 1995). I suggest that applied linguistics can draw analogically on this new direction in science for ways of conceptualising language in use; a longer term aim will be to see whether language in use may actually work as an example of a complex system, as technological evolution is now held to (Kauffman 1995). For this study, complex systems theory appears to offer potentially helpful ways of describing metaphor at work in interaction.

The basic shift in conceptualisation required by adopting a complex systems approach reflects the move away from "language" viewed as an abstract, static symbol system, brought into use by individuals, to the view of "language in use" as described in the previous section. If language in use can be seen as a dynamic and adaptive system (or set of systems) that evolves with use, across interactional events for individuals, and, over time at the larger level of social groups, there then follow various other new or shifted perspectives. I first explain the justifications for taking a complex systems view of language in use, and then briefly examine major implications for this study:

1.6.1 Seeing language in use as a complex adaptive system

A *complex* system contains "a huge number of elements with many degrees of freedom" (Mainzer 1996:3). The elements of the system, which may themselves be systems, have many different ways in which they can interact (Waldrop 1992:11). Because of the many, and many types of, interactions between elements, complex systems are *nonlinear*. A linear system is one in which elements act independently of each other, with the whole system amenable to straightforward analysis and explanation as the sum, or superposition, of analysis of its parts, in traditional reductionist ways (Waldrop 1992:64; Mainzer 1996:3). In nonlinear systems, elements are not independent, and alterations to one element can have knock-on effects on other elements. Before the advent of powerful computers, physicists and mathematicians had no easy ways to work with non linearity, and so very often carried out idealisations to simplify relations to produce linear equations that could be solved. Once nonlinear equations could be tackled through recurrent numerical calculations, descriptions of non-reductionist behaviour became available. In one direction, this has led to the development of Chaos Theory, in which very small changes in elements can give rise to huge changes in the behaviour of a system as a whole.

The starting point for this new view of language is to consider what an individual brings to an interaction or discourse event in terms of language resources. These language resources would seem to possess many of the features of a complex adaptive system:

- they are *not independent of context*, in that they are influenced by the goal of the event, and /or context-based processing constraints
- are *systematic*
- are *nonlinear*, in that they link into other, interactional and cognitive, resources,
- are *adaptive*, in that individual contributions to the event are adjusted as the interaction proceeds, in order to take account of misunderstandings, interruptions, and other internal or external problems that may arise.

We can thus see the language of the individuals in interaction as complex adaptive systems, that 'co-evolve' as the interaction proceeds to produce a further complex system that is the discourse or "language in use". The complex systems analogy at once allows a move away from the idealised, reductionist, situation, in which the "whole" of language use is broken down into "parts", either parts as individual language use or parts as separation of context from language. Such a move is largely congruent with the holistic perspective of this study, discussed earlier in the chapter (1.4). I note, however, that "Prosaics is suspicious of systems in the strong sense" (Morson and Emerson 1990:27), but that this suspicion derives from the requirement of linear systems theory that subsets are independent of each other, which is clearly unreasonable when applied to language in use. Complex systems appear to allow the possibility of inter-relatedness and inter-dependence, and thus to dissipate much of this suspicion.

The complex systems analogy produces a subtle picture of the interrelationship of context, individuals' language use, and interaction, through two key aspects of complexity theory: emergence and self-organisation.

1.6.2 Emergence

Emergence is described as the appearance of simplicities from lower-level complexity: "regularities of behaviour that somehow seem to transcend their own ingredients" (Cohen and Stewart 1994:232). As examples, we can take colour, which cannot be traced into any particular component of something possessing colour e.g. a flower; or life - "emerging from chemistry by way of DNA" (ibid:232). The importance of such emergent simplicities present a clear and intriguing parallel with Bakhtin's concerns about the importance, and difficulty, of explaining the simple in language use described in 1.1 above:

Scientists have been asking the wrong question.

They have focussed upon complexity, and they have taken simplicity for granted.

The answer to complexity turns out to be fairly obvious and not, in itself,

especially interesting. If you have a lot of simple interactors, and let them interact, then the result can be rather complicated.

The interesting question is precisely the opposite, the question that most scientists never thought to ask because they didn't see that there was a question to ask. Where does simplicity come from? (Cohen and Stewart 1994:222)

Clark (1996) describes conversation as one type of emergent simplicity, resulting from the smaller joint interactions in which participants co-ordinate their talk and action. In this study, I wish to explore the possibility, and implications, of seeing metaphor as an emergent simplicity of the interacting complexities of language in use.

1.6.3 Self-organisation and 'the edge of chaos'

Within the study of biological systems, the emergence of order and organisation through the adaptive behaviour of interacting systems is leading to new accounts of biological evolution, in which an inevitable trend towards order works, with natural selection, to explain the existence of life as we know it (Kauffman 1995; 1993). Co-evolving complex systems appear to have three directions in which they can develop or evolve:

- towards frozenness, stability and order
- towards 'chaos'
- towards further and rapid development, 'at the edge of chaos'

(Kauffman 1995; Waldrop 1992)

In use of language, the co-evolving systems of individuals in contexts working towards mutual understanding often develop towards fixed order and stability, at least over a certain time scale. That after all is how it is possible to abstract *langue* from *langage* (Saussure 1916), to talk about 'the English language', to identify 'rules of conversation' that appear, post-hoc, as organisational features (Clark 1996), and to describe social group conventions of "speech events" (Hymes 1972). 'Chaos' in evolving language in use between individuals would amount to communication breakdown and misunderstanding. The edge of chaos in evolutionary biology is the preferred place to be; there, evolution takes place most effectively and rapidly. In this study I investigate whether metaphor use in discourse events can be seen as operating in an 'edge of chaos' fashion. Parallel claims have been made at macro-level for metaphor as a major force in the generation of new ways of using language (Rorty 1989).

Just as the environment in which evolution takes place is itself altered by the outcomes of evolution, in a dynamic process of co-evolution, so too are the cognitive and linguistic 'landscapes' of participants in interaction altered by the interactions in which they

participate. In the short term, understandings will change as the interaction progresses, and this will include the understanding of language used metaphorically and of the ideas expressed through metaphorical language. Longer term changes in understandings will include learning through metaphor, which this study aims to investigate, and acquisition of the underlying metaphors of a cultural that reflect values, attitudes and beliefs.

1.7 Conclusion

This first theoretical chapter has begun to establish the broad framework and parameters of a prosaic approach to metaphor as needed for this study. Prosaic metaphor, and the impact of metaphor, is to be investigated in its discourse context, through the language of interacting individuals and through what can be discovered or inferred of underlying thought processes, in the joint construction of understanding. Complex systems theory has been drawn on to provide, at a macro level, useful analogies in emergence and self-organisation for describing how metaphor is chosen for use in interaction and made sense of.

Examples from the classroom have been used to illustrate how, within an educational context, metaphor is used for facilitating transactions, for creating impact, for personal pleasure, and for pushing forward conceptual understanding. In the classroom, metaphorically used language was part and parcel of the stream of language and thinking that individuals and groups were producing, receiving and participating in all day long. The implications that have been drawn out of this brief initial look at classroom discourse - that assumptions about receivers of metaphor need to be made explicit, and that metaphoricity lies in use - apply to metaphor beyond the classroom too; they have been highlighted within a specific discourse context, but they are not restricted to that context. As I will show throughout the rest of this thesis, the perspective of metaphor as use of language does not, for an applied linguist, cast metaphor into the outback of pragmatics, but instead implies that metaphor must be described and analysed in the full light of its role in prosaic discourse and interaction.

An important distinction has been made between linguistic metaphor, to be identified at theory-level, and process metaphor, to be identified at conceptual-processing level. Incongruity between a possible Vehicle term and the on-going discourse has been established as an initial criterion for identifying a stretch of language as a linguistic metaphor. In the next chapter, I develop, through reviews of relevant literature, further conditions for metaphoricity in order to generate an operational definition of linguistic metaphor in discourse.

CHAPTER 2

THEORETICAL BACKGROUND: LITERATURE REVIEWS

2.1 Introduction

In this chapter, I review a selection of the vast literature related to the study of metaphor in educational discourse. I begin with metaphor theory, going back to Aristotle as a starting point, then jump forwards to review key work in the second half of this century, and through to current developments in cognitive linguistics and psychology. The work is reviewed for its usefulness to a prosaics of metaphor in use in discourse, and in the light of the need established in Chapter 1 for consistency between theory-level accounts and conceptual-processing accounts. I then review research studies into children's production and understanding of metaphor, using the results and limitations to suggest specific implications for this study. The reviews in this chapter will help to clarify the nature and characteristics of different types of metaphors, and begin the process of constructing a descriptive framework for prosaic metaphor that uses graded features. Key points and summaries are marked by the use of diamond bullet points.

2.2 A review of the literature on metaphor

2.2.1 Overview

An historical perspective on metaphor studies, starting from Aristotle in the 4th century B.C., suggests a continuing concern with metaphor as both linguistic and cognitive. Furthermore, metaphor has often been studied in particular contexts of use, connecting the cognitive with the socio-cultural. In the first half of the twentieth century, however, this broad perspective, incorporating the linguistic, the cognitive and the socio-cultural, seems to have been somewhat lost, probably as a side-effect of the constraints imposed on research by major contemporary paradigms.

A major constraint on metaphor theory within linguistics and philosophy in this century has been the use of formal logic as the basis for theory-building and argumentation, accompanied by a view of language as a static, decontextualised system. Metaphor was relegated by some from linguistics altogether, seen as irrelevant to the formal study of language, and/or relegated to the less central area of pragmatics, where the meaning of metaphor is to be inferred from the literal sense of the word (e.g. Searle 1993). In the vocabulary of Chapter 1, Section 1.4, theory about linguistic metaphor was developed independently of conceptual-processing evidence. Thus in 1980, Lakoff and Johnson could write:

... metaphor is typically viewed as characteristic of language alone, a matter of words rather than thought or action. (Lakoff and Johnson 1980: 3)

The shift in metaphor studies back to a more overtly cognitive position, largely prompted by Lakoff and Johnson's (1980) book *Metaphors We Live By*, arose from perceptions of the inadequacies of formal logic-based approaches, and from the need to take account of new findings about the psychology of categorisation, including prototype theory. As a result of work carried out in metaphor studies in the last two decades, it is currently uncontroversial to take metaphor to be a mental phenomenon, sometimes manifested in language, sometimes in gesture or in graphical form, and contemporary metaphor theory is once again dominated by the cognitive (Lakoff 1993). What is new about the current cognitive trend is the strength of some claims about metaphor and thought, and the breadth that can be brought to metaphor studies by recent developments in psychology and language processing. Before examining current approaches to metaphor, I summarise some of the earlier key theory .

The literature on metaphor is so vast as to prohibit anything approaching complete coverage; any literature review is bound to be partial, and this one is no exception. Major theories of metaphor are drawn on selectively, with a focus on work is central in the field or which is used in child language studies. The review aims to extract aspects of metaphor theory that will potentially help with identification and description, rejecting ideas that are inapplicable to dynamic and prosaic uses of language. The literature review produces various dimensions of metaphor, which, while they do not function as necessary conditions for metaphoricity, help in constructing a description of metaphorical language through gradable features. This innovative 'graded features approach' to the description of prosaic metaphor will be justified in detail at the beginning of Chapter 3.

2.2.2 The Substitution Theory of metaphor

Aristotle is usually cited as the source of two approaches to metaphor, the Substitution view and the Implicit Comparison view, both of which have been largely rejected by more recent writers (Black 1962;1979) as too simple to account for the full richness of metaphorical language. In reviewing these two theories, I suggest that Aristotle's work was not in fact overly simplistic, but has been, rather, simplified, as later writers developed his ideas, and that both theories identify useful aspects of metaphor that can be retained in a prosaic approach.

The earliest documented discussions of metaphor were part of the study of Poetics and Rhetoric undertaken by Aristotle in the 4th century BC. Surveys of his writing on

metaphor (in, for example, Ricoeur 1978, Black 1962, Winner 1988) suggest that Aristotle generated many of the basic ideas that still hold sway in the study of metaphor. At the same time his work left open a range of avenues for exploration by future scholars who, despite taking metaphor study forwards in quite differing directions, can all claim him as the progenitor of their differing views. For Aristotle, successful metaphor in rhetoric combined "clarity, pleasantness and unfamiliarity" (Aristotle, translated by Lawson-Tancred 1991:219) and, when used appropriately, could act cognitively in producing new knowledge. He thus identified the cognitive function of metaphor that has become paramount in the last two decades.

In the Substitution theory as developed since Aristotle, the 'device' of metaphor has been characterised as renaming. Definitions of metaphor claiming to derive from Aristotle, usually take a form such as the following:

metaphor is the application to one thing of the name belonging to another
(Aitchison 1987:144)

METAPHOR: A rhetorical figurative expression of similarity or dissimilarity in which a direct, nonliteral substitution or identity is made between one thing and another.

(Myers and Simms, Longman Dictionary of Poetic Terms 1987)

Identification of linguistic metaphor would then require the identification of the named (Vehicle) and the absent but re-named (Topic). I argue that to attribute a view of metaphor as re-naming to Aristotle is a simplification and mis-representation of his ideas (see also Mahon, in press). The substitution view of metaphor is often dismissed as inadequate, because it results in entailments such as

- the absent name is the literal equivalent of the metaphorical expression
- the metaphorical expression can thus be paraphrased to produce an equivalent literal expression
- understanding a metaphorical expression can be demonstrated by replacing it with the literal or original name
- the use of a metaphor does not necessarily produce additional information about the thing thus renamed; it is decorative or ornamental, and can be dispensed with
- metaphors are essentially nominal in form

From examination of his works, it is not entirely clear how Aristotle has become so thoroughly linked to this in the metaphor literature (e.g. Gibbs 1994; Black 1979 and 1993). I can find no evidence in Aristotle's "Art of Rhetoric" (in translation, Lawson-

Tancred 1991), for example, to support Ricoeur's claim that metaphor for Aristotle gave primacy to nouns through a focus on names and renaming (Ricoeur 1978: 47). In this work, in fact, Aristotle presents examples of phrase and word length metaphors, including noun, verb and adjective metaphors, and describes the relation between metaphors and similes:

Metaphors will of course also be similes, and simile are metaphors that invite explanation

(Aristotle, transl. Lawson-Tancred 1991:224)

Aristotle thought most highly of metaphors based on analogy, of the form A is to B (Topic) as X is to Y (Vehicle) (Kittay 1987:2-3; Lawson-Tancred 1991:40).

For example,

*the youth killed in the war had so disappeared from the city
as if someone had taken spring from the year*

(Aristotle, trans. Lawson-Tancred 1991:236)

The Topic terms in this example are *the youth killed in the war* ---- *city*

and the Vehicle terms are *spring* ----- *year*.

It could be argued that the verbs (*disappeared* -- *taken*) are also part of the analogy. Although the surface linguistic form of the analogy can be seen as having four, or possibly six, terms, in fact, the mental processing of the analogical metaphor draws on many more aspects linked to the Topic and Vehicle terms. Aristotle described the process of metaphor, the "*seeing in terms of*", as finding similarities within differences (Kittay 1987), and suggested that, in order to interpret the sentence, receivers would need to draw on common cultural connotations, or "endoxa", of the terms.

An important difference in extension of the term 'metaphor' in classical Greek and in current-day English may have helped to generate some of the misrepresentations of Aristotle's views. Aristotle used the term 'metaphor' with a much wider reference than currently holds; for him, 'metaphor' referred to any type of expression which was substituted for another, including diminutives and euphemisms, and to ways of talking about Topics that had not before been conceptualised, 'catachresis', for which there would clearly be no expectation of a literal equivalent (Lawson-Tancred 1991). Twentieth century writers often take a much narrower view of metaphor, and it may be that theory was transferred inappropriately from the broad to the narrow concept of metaphor. The views inaccurately attributed to Aristotle may also result from the use by later writers of inaccurate earlier translations, such as the 1457 translation that Aitchison (1987) draws on.

I would note at this point that Aristotle's broad application of the label 'metaphor' may be in line with the prosaic perspective on metaphor taken in this study, and that to avoid similar problems arising in reverse, care will be taken in this study in transferring theory that has been developed for a narrower definition.

The use of metaphor for Aristotle was always intentional, but, since he was aiming to describe deliberate effects of style in political rhetoric, rather than metaphor in spontaneous conversation, this is not surprising. Further, since Aristotle was exploring metaphor within particular discourses of politics, it could be said that his theory was context-based (as per Section 1.5.3). In taking his ideas out of the particular context of use and applying them to metaphor in general, much of the precision of Aristotle's points has been lost.

Aristotle's idea of metaphor as a dynamic cognitive process of substitution of the unfamiliar to produce new knowledge, put forward in 4th century BC, has, in later versions of the Substitution view, been turned into something much weaker: the use of the name of something to apply to something else. If the focal point of the metaphor is the static "name", then a description of metaphor requires merely the identification of the "name" that is falsely applied. The discourse context will provide a **minimal** amount of information beyond the immediate linguistic context of the textual fragment containing the metaphor. We can note that many metaphors in poetry or drama would, in fact, be identifiable and describable in this way, and metaphors described as *A is B* (Lakoff and Johnson 1980) appear to fit this model, with A renamed as B :

Juliet is the sun;
the world is an unweeded garden (Shakespeare)
my love is like a red, red rose (Burns)

as would the use of pet names or insults, which may be one of children's early introductions to metaphorical language (Marjanovic-Shane 1989):

don't eat like a pig!
you're my little honey pot
who's a sweetie pie?

- ♦ Constructing metaphor by substitution of Vehicle for Topic thus appears to be simple and direct. While the theory is clearly inadequate for much metaphorical use of language, it may be employed when appropriate, and so is not dismissed at this stage.

2.2.3 Metaphor as Implicit Comparison

Metaphor as Implicit Comparison can be seen as a special case of the Substitution view in which metaphor is a figurative expression that essentially transforms meaning through analogy on the grounds of similarity; every metaphor, in this view, is seen as a reduced simile (Black 1962, 1979; Searle 1993), with the "device" of metaphor operating through comparison and identification of similarity. A major problem for the Implicit Comparison theory, as for the Substitution theory, is the apparent requirement, as a necessary condition for linguistic metaphor, for the existence of a paraphrase or literal equivalent of the metaphorical expression (Black 1962; 1979). Within Implicit Comparison theory, the similarities upon which the metaphorical transfer are based are again held to be accessible to full explication, or, as Mark Johnson puts it:

(to) exist objectively within the world ...and (be) expressible in literal propositions
(Johnson 1987:68)

A metaphor *A is B* can be expanded into similes: *A is like B in certain ways* where the "certain ways" can be spelt out. So a metaphor such as *Juliet is the sun* can be expanded into *Juliet is like the sun in that she is the centre of my existence; seems to radiate light...* These "certain ways", though, are still a long way from being literal propositions; to reach that point, a large amount of paraphrasing, and explanation of connotations, would be required. When metaphors can only have meaning through their literal equivalents as postulated by the Implicit Comparison view, they are also implied to be dispensable and can be removed from a text without removing anything essential of the meaning of the text. Writers such as Winner (1988) and Ricoeur (1978), who hold metaphor interpretation as essentially irreducible and creative, therefore hold the paraphraseability requirement of metaphor, inherent in the Implicit Comparison theory, to be the weak point.

A way out of this dead-end lies in recognising that, as Winner (1988) points out, the psychological processes underlying the construction of meaning through metaphor and the linguistic analysis of surface forms of metaphor are being silently conflated through the notion of implicit comparison. An analyst may be able to expand a metaphor by finding the grounds for similarity and paraphrasing them, but this does not mean that an individual using metaphor in discourse will do the same; a finite, exhaustive, set of literal propositions that express metaphorical meaning cannot be established for each individual processing the metaphor. We need, as Cooper says (1986:71) to separate indeterminacy and open-endedness (in individual interpretations) from paraphraseability (at a theoretical level), and metaphors may differ in how easily they can be paraphrased, independently of

the ease with which any individual can interpret them. Statements made about the paraphraseability of metaphors do have a link to indeterminacy - through probability; an easily paraphrased metaphor is more likely to be interpreted successfully and appropriately by individuals.

- Paraphraseability, no longer a necessary condition for metaphor, becomes a gradable feature that can be included in a multi-dimensional description of metaphor.
- The distinction between individual interpretations and claims made more generally across individuals is important and will be picked up again in the next chapter.

2.2.4 The Interaction Theory of metaphor

Black developed a theory of metaphor in which 'interaction' between the Topic and Vehicle (here, of course, indicating a cognitive process, rather than talk) is seen as leading to the creation of similarities rather than the activation of pre-existing ones, as in Substitution or Implicit Comparison theories. With this focus on the creativity of metaphor, Black's seminal exposition of the Interaction view in his papers of 1962 and 1979 (the latter reproduced in Ortony 1993) has provided a basis for much theoretical and empirical work (e.g. Ortony 1979; Kittay 1987; Forceville 1994). The Interaction view captures much of what is needed for this study in terms of a process-based approach, apparently sited within the individual mind/brain. It is not however, as we shall see, prosaic, in the sense of catering for everyday, ordinary language in use, and, to this end, I shall need to reclaim several categories of metaphor, discarded by Black as unworthy of attention.

Black's attack on Implicit Comparison and Substitution theories (1979, 1993) was based on a challenge to the notion of similarity, which he held as being inherently vague and subjective. More recent work in cognitive psychology has justified Black's worries about similarity, shedding doubt on its status as a primary mode of categorisation in on-line processing (e.g. Rips 1989). The Interactionist view sees metaphor as functioning creatively, not merely through a transfer of properties from one entity to another, from Vehicle to Topic, but through a process of 'interaction' between conceptualisations of Topic and Vehicle that generates new, and irreducible, meanings (Black 1962; 1979). Black proposed that a listener or reader would bring to the interpretation of Topic and Vehicle terms in a metaphor a "system of associated commonplaces" (1962:41), somewhat akin to Aristotle's *endoxa*, and later reworded, after criticism from Ricoeur (1978:88), as "an implicative complex" of understandings and beliefs (1979:28). The interaction of the two complexes in the processing of metaphor, through a mental

process of projected selection, mapping and organisation, produces an unparaphraseable, new meaning .

Black's work brought the cognitive role of metaphor back to centre stage, after long periods since the time of Aristotle when metaphor had been seen as mere decoration or rhetorical ornament. The cognitive function had been given importance intermittently since 300 BC (Bowes 1990), in for example, the work of Quintillian in the second half of 1st century AD, of Tesauro and Vico in the 17th and 18th century (described in Eco 1984) of Rousseau (Kittay 1987) and of Nietzsche (Cooper 1986:2; Hinman 1982). Black himself traces his ideas back to Coleridge, via I.A. Richards, for whom metaphor was a process of the imagination that could unite or fuse images and perspectives into a creative and new whole.

Black elaborates claims for an Interactionist view of metaphor, and the processes involved, but does not go on to turn these into necessary conditions for the identification of metaphorical expressions, emphasising that this would result in a very narrow definition of metaphor which would exclude examples that might be included by a Substitution or Implicit Comparison view. He suggests that the three views can work together to define groups of metaphors, and, for the prosaic objectives of this study, this would seem an important consideration. However, Black then proceeds to cut down the category of metaphor, by, first, distinguishing "active" metaphors from "dead" metaphors, and then by further restricting his concerns in his 1979 paper to those "strong" active metaphors i.e. those metaphors that are also creative and novel. For my child-oriented purposes, the normative assumptions that underlie the nature of "active" and "strong" metaphors need to be examined. It seems impossible to construct criteria for omission and inclusion in the set of strong, active metaphors without taking into consideration who is processing the metaphors and in what contexts. Black does not do this, but appears to work according to inexplicit rules, which I will proceed to try to uncover.

"Active" metaphors are contrasted by Black with those that are "extinct", those which no longer have any original meaning different from their current meaning, or "dormant", those where the original meaning is not active but could be brought into understanding. Active metaphors are those "that are, and are perceived to be, actively metaphoric"; they are "recognized by speaker and hearer as authentically 'vital'" (1979:26). These would appear to be processing criteria, and "active" metaphors appear to coincide with what I have labelled "process metaphors". No conditions for deciding how to operationalise this recognition procedure, i.e. to use them at a theory-level, are suggested; what is and is

not "vital" appears to be judged by unspoken norms, and the judgement left to the decision of the analyst as informed native-speaker. Black hints at the norm in his use of the example *falling in love* as an expression, which he **claims** would not be seriously taken as metaphorical by a "competent reader". He confounds etymology with synchronic norms too at this point, by adding that: "it is doubtful whether that expression was ever more than a case of catachresis" (1979:26).

- I contend that, in identifying active / process metaphors, Black conflates the following, which should be clearly separated in setting up criteria for metaphoricity:
 - etymology and the origin of words;
 - norms of meanings of words across a speech or discourse community;
 - individual mental conceptualisations of the meanings of words.

"Active" metaphors could be defined relative to any one of the three, but the three do not necessarily, or even usually, coincide (except of course for classically-educated academics such as linguists and philosophers), and they almost certainly do not coincide for children. For example, alerting children explicitly to the metaphorical possibilities of language in use undoubtedly activates, albeit temporarily, even those metaphors held to be "beyond resuscitation" (Fozard 1992); the example of *hot spells* given earlier shows how individual mental conceptualisations may deviate from both etymology and community norms.

Black further divides active metaphors according to qualities he labels "emphasis" and "resonance" (Black 1979: 25). Emphatic metaphors have a great deal of unstated meaning, that a listener or reader is required to work out, and are therefore irreplaceable. Resonance refers to the richness and depth of the system of implications, obvious or non-obvious, attached to the metaphorical term. "Strong" metaphors are those that are both resonant and emphatic, and, once again, the identification of these raises the problem of assumed norms of background knowledge that might not exist or might not apply to individuals. While both strong and weak metaphors are allowed the possibility of being creative, the rest of Black's paper, exploring the process and results of interaction, is focused on strong metaphors. In using Black's ideas, this must be taken into account, and it is not uncommon for discussions on the Interaction view (including Winner 1988 and Kittay 1987) to omit reference to the distinctions made by Black, thus risking over-generalisation of his ideas.

- "Emphasis" and "resonance" are gradable features of metaphor, generated by Black's work.

The review of Black's work highlights again the conflict between an initial description of the use of metaphorical language as a conceptual process, in this case a process of "interaction", and subsequent analysis in static product terms such as "active" and "strong" metaphors. One way forward through this conflict has been clarified: by making a clear distinction between etymology, synchronic norms, and individual mental conceptualisations as bases for classification criteria.

- There is a clear need for studies of children's language to decide, and to state explicitly, whether their definitions and descriptions of metaphor adopt adult norms, create age-related norms and the risk of disorder and cross-study comparability this generates, or to deal in some other way with the idiosyncrasies of children's use.

This problem also suggests that adult studies of metaphor may be over-optimistic when they ignore the high probability that adults will, as individuals, also deviate from assumed norms.

Focus and Frame

Black's Interaction theory takes metaphor theory forward in a cognitive direction: the underlying conceptual systems of Topic and Vehicle are seen as somehow 'interacting' in the processing of metaphor to produce an understanding. He also offers a useful unit of analysis in the Focus and Frame of metaphor. The Focus of a metaphor is the unexpected term i.e. the Vehicle term, and the Frame is the rest of the sentence against which the Focus appears incongruous (1993: 27). When a holistic, discourse approach is taken, this essentially semantic notion (Steen, in press) needs to be refined; the Frame will not often be a sentence, rather, as the immediate linguistic context of the metaphor, it may be all or part of an utterance, with indeterminate boundaries. This is further developed in Chapter 3.

Black's work has been built on in several ways that are reviewed in subsequent sections: first I look at Ortony's development of the notion of similarity and difference, which has been employed in a number of empirical studies. I then examine how Kittay has taken up Black's challenge "there can be no rules for 'creatively' violating rules" (1979:25) in work on a "perspectival" theory of metaphor. The exploitation of the cognitive, creative function of metaphor by Lakoff and Johnson (1980) and related work in an Information - Processing paradigm is then reviewed.

2.2.5 Metaphor Interaction as Predicate Transfer

Ortony elaborates the nature of metaphor interaction and comparison in terms of selection and transfer of 'predicates' between the Topic and the Vehicle. Ortony (1979) attempts to solve the theoretical problem of explaining which features are transferred by examining the relative salience of the various attributes of Topic and Vehicle. To take an example: in accounting for interpretations of the metaphor *a galleon moon*, attributes of the Vehicle *galleon* such as colour of sails and type of movement are assumed salient, and held to be transferred to the understanding of the Topic *moon*. Other Vehicle attributes, such as the number of crew and the flag flown, are assumed to be less salient and thus less likely to be transferred.

Ortony's view holds metaphor as centrally concerned with similarity between Topic and Vehicle, but uses a theory of similarity which highlights the potential asymmetry of similarity (Tversky 1977). Tversky's theory goes beyond a conventional geometric model of similarity, in which the degree of similarity of two entities is represented (metaphorically) as the distance between the two as points. Criticisms of the adequacy of such a model are made on both ontological and logical grounds (Nöth 1985), since in many real-world examples similarity is not a reflexive relation, and there may be more than one way in which entities can be similar. For example, we would mean different things by saying *The boy is like his father* and, in reverse, *The father is like his son*, while the example given by Ortony, *Raspberries are like blackberries* can be more easily reversed to *Blackberries are like raspberries* without too much change in meaning. Tversky's alternative to a geometric model is based on the matching of "features", renamed "predicates" by Ortony, and representing "knowledge, a belief, or an attitude about or toward something" (Ortony 1975:191). Predicates vary in the levels of salience that they have for different objects and in different situations. For example, we can take the predicates of Topic and Vehicle in the following metaphor produced by a child:

a dead rainbow (child 7;0, pointing to an oil patch on a wet road. Author's data)

The Vehicle term *rainbow* can be said to have among its predicates *a promise of future goodwill from God* and *having all possible colours in a non-variable sequence*. The second is clearly of higher salience in the context of the oil patch than the first. One can however imagine a scene in a film where the resolution of a disagreement is accompanied by the appearance in the sky of a rainbow. In this situation, the first predicate would be of higher salience than the second. Ortony contends that metaphors are characterised by "salience imbalance", with 'interaction' involving stronger transfer from Vehicle to Topic

of predicates salient to the Vehicle (in the context of the Topic) than in the opposite direction from Topic to Vehicle.

Ortony's ideas have been used as the theoretical underpinning for several studies into children's comprehension of metaphor (e.g. Evans and Gamble 1988; Wales and Coffey 1986). However, as with Black's work, there is potentially a problem with the relative nature of 'salience', and with assessing salience, that is particularly relevant to work with children; what is salient for one person may not be salient for another because of differing life experiences, even if all other contextual features are held constant. For example, to a young child, a salient feature of pizza may be that it makes a regular appearance on a Friday supper table, rather than its Italian origins. Assumptions made by experimenters about the salience of predicates of metaphors used in empirical studies will thus be open to questions of validity.

A helpful aspect of Ortony's work is the distinction he makes between "predicate promotion" and "predicate introduction" metaphors; the former provides more information about a Topic that is familiar, whereas the latter provide information about unfamiliar Topics. He suggests that different psychological processes may be engaged to interpret the two types, with predicate introduction metaphors involving more holistic processes and perhaps greater use of imagery. If this were so, then we might expect young children, for whom the chance of encountering unfamiliar Topics is greater, to respond more to image-rich metaphors.

- Topic familiarity is carried forwards as a further gradable dimension of metaphor.

2.2.6 A Perspectival Theory of metaphor

Kittay (1987) develops her Perspectival Theory of metaphor by building on Black's Interaction Theory through semantic field theory. Her closely argued case is convincing, and produces some useful conclusions which will help in the theoretical task of identifying metaphor.

Both Kittay (1987), and Johnson (1987), criticise Black's Interaction Theory of metaphor for not sufficiently accounting for which implications and predicates are involved in the interaction and how. Kittay's development of the Interaction theory is an attempt to answer the criticism by detailing more precisely a theoretical account of the processes of interaction in producing and comprehending metaphor. In this account, a first indication of potential metaphor would be an incongruity between the conceptual domains underlying two (or more) terms referring to one entity, state or process (the Topic). The incongruity is generated by the inclusion of the Vehicle lexical item(s), and the

incongruity between Topic and Vehicle domains then has to be able to be resolved through a search for coherence. The resolution of the incongruity is accounted for by positing an interaction of the conceptual domains of Topic and Vehicle as a transfer the systems of semantic relations. The systems of relations are the systems of contrasts and affinities that would generate the first order meaning of Topic and Vehicle; a key point here is Kittay's use of a relational theory of meaning i.e. one "in which contextual features are constitutive of meaning" (1987:97)

With a relational concept of meaning, the traditional definition of metaphor is transformed. A transference of meaning is not a simple displacement of an atomistic meaning but a move from one system to another, from the system embedding a term in its literal-conventional sense to another system which will give the term its new metaphorical significance. (Kittay 1987:138)

Metaphorical meaning can thus be established through second-order activity: the interaction of the two first-order meanings, operationalised in process metaphors as analogical reasoning. The cognitive importance of process metaphor then arises from the restructuring of the Topic domain in terms of the systems of relations obtaining in the Vehicle domain; transfer of meaning can then be seen as operating at the level of systems and structures, rather than at the level of semantic features (Levin 1977) or predicates (Ortony 1979).

The theoretical notion of "domain incongruence", which Kittay places at the base of metaphor identification, also, she claims, accounts for, and can thus replace, Ortony's "salience imbalance" as a defining feature of linguistic metaphor. Incongruity between Topic and Vehicle domains generates the semantic or pragmatic anomaly that characterises a metaphorical use of language, and which in practice may prompt readers or listeners to search for a metaphorical interpretation.

Forceville (1994) criticises Kittay's focus on relations and semantic field theory for downplaying the possibility of transfer of properties and connotations. It is not clear whether or not Kittay's theory allows for properties and connotations to be included under the term "relations"; her insistence on the importance of context in meaning suggests she would intend them to be. It is also possible to imagine constructing a delicate and detailed enough set of contrasts and affinities from which commonly-shared connotations would emerge; for example, reaching the loneliness connoted by the sound of a wolf baying through contrasting details of where wolves and people tend to find hospitable places to live, recalling the habit of wolves to attack people, the night time as particularly dangerous for a solitary person, and so on. Putting this more generally, since

Kittay is not addressing individual processing instances but theoretical issues, the only connotations relevant to her theory are those that are cultural norms, and may thus be said to be part of systems of cultural knowledge. It may be for this reason that she does not explicitly include them in the "systems of relations" within semantic fields that comprise the meaning of a lexical item.

A more real difficulty that I perceive in using Kittay's conditions for the identification of metaphor in discourse data lies in how to operationalise "distinct conceptual domains", since it is almost always possible to create a chain of contiguities that move continuously from one domain to another, a point made by Eco (1984) when he suggests that metaphors can be reduced to metonymies. In the example of *a galleon moon*, *moon* and *galleon* appear to be drawn from distinct domains of say *heavenly bodies* and *ships*, it is, however, possible to construct links between these domains, and thus render them non-distinct, through, for example, the use of the stars to guide mariners, or galleons full of Spanish gold coins round like the moon. The distinctiveness of domains, yet again, rests a matter of judgement based on conventional norms; every attempt to be absolute seems doomed to relativity. However, once we move from the theoretical to the empirical, with a concern for individual processing, relativity is resolved, and the need to demonstrate domain distinctiveness is replaced by a need to demonstrate incongruities between activated conceptualisations of Topic and Vehicle in particular discourse contexts.

- The degree of incongruity between Topic and Vehicle, for individuals and groups, will be taken forwards as a further dimension of metaphor; it provides a necessary condition for metaphoricity, and is also gradable.

2.3 Contemporary cognitive theories of metaphor

The term "cognitive" as in, for example, "cognitive linguistics", "cognitive psychology" and "cognitive science" is used with a range of meanings. In the first two labels, the term "cognitive" implies an information-processing approach to theory and investigation; in the wider arena of cognitive science, the term has the broader sense of related to the "understanding of the mind" (Eysenck and Keane 1995:3; MacCormac 1985). I use the term in this broader sense, and later in this section discuss the limitations of the narrower information-processing approach.

2.3.1 Conceptual metaphor

Black's work provided a foundation for the cognitive role of metaphor to be extensively developed. It was taken further by Schön, Reddy and others, in the influential collection

of papers edited by Ortony (1979; 2nd edition 1993), and by Lakoff and Johnson's ground-breaking book "Metaphors we live by" (1980), which redefined metaphor as "a figure of thought" rather than "a figure of speech", and suggested that our very conceptualisations are structured metaphorically in long term memory. Even after metaphors have become conventionalised, they can be seen to reflect systematic, metaphorically constructed structures of thought; metaphorical extension is held to be a primary way in which categories are extended and in which language is used to describe abstract notions and experiences (Lakoff 1987). This in turn leads to the possibility that "metaphors may create realities for us, especially social realities" (Lakoff and Johnson 1980:156). Although limitations to this strong view have been put forward (Keesing 1987; Quinn 1991), there is an ever-increasing collection of papers that seek to uncover conceptual metaphors used consciously and unconsciously in particular discourse situations, and claim to reveal possible implications for thought and action: Reddy examined metaphors of communication itself (1979); Sontag deconstructed metaphors of illness (1991); Novek (1992) examines the metaphors of literacy; Fairclough (1990; 1992) includes the analysis of metaphors in particular discourses as part of "critical discourse analysis". This mode of research has also begun to ask whether metaphor does not perhaps offer ways to change behaviour and thinking through conscious unveiling of metaphors that guide action and replacing them with alternative metaphors (Gibbs, in press). This would have implications for work in a range of fields connected with 'social reality', including counselling and organisations management.

Lakoff and Johnson leave themselves open to some criticism in respect of their method of identifying conceptual metaphor (1980). They approach this task through analysis of Topic-Vehicle relations in examples of conventionalised metaphors that they seem to collect from their own knowledge of language as native speakers i.e. through reflection, rather than through use of corpora (Deignan, in press) or other empirical methods. Generalisations are then made from surface language items to (inferred) systems of thought, and inferences made from collective systematic use of language to individual thought patterns, in a silent move from "metaphor as device" to "metaphor as use". I suggest that the first generalisation, inferring individual conceptualisations, processing, and possibilities for action, from evidence about speech community norms, raises questions about validity. The second assumption, which has been questioned by Steen (1994) and Gibbs (1994), is that, within an individual, the structure of conceptualisations in long-term memory is mirrored in the structure of concepts actually used in on-line processing. An individual may have conceptual memory that is metaphorically structured e.g. *arguments* may be conceptualised through analogy with *war and battles* (Lakoff and

Johnson 1980), but in any particular instance of talk about arguments, those metaphorical structures may or may not be activated. So a speaker may say to another *I would like to challenge your last point* without activating any alternative sense of *challenge*. Lakoff's theory development seems to disregard the need to justify moving between community and individual, and between long term memory and on-line processing within individual language use. In the study of metaphor in children's language development and use, it is important to keep these distinctions clear, so that individual development can be investigated against a background of adult and peer norms that may be subverted, adjusted or adopted. Children acquire and develop the conceptual metaphors of a community, and, in this process, may construct partial or inaccurate conceptual metaphors of their own, which would be of research interest.

These criticisms of method aside, Lakoff and Johnson's work offers the following key points:

- ♦ The existence, in English as a language, of conceptual metaphor should be manifested through systematicity in linguistic metaphor.
- ♦ The possibility of metaphorical structuring of concepts in long term memory will be reflected in activation models of metaphor processing, and in possible systematicity in individual and shared use of metaphor.

2.3.2 Empirical work in the Lakoff and Johnson cognitive tradition

Gibbs links the ideas of Lakoff and Johnson to an historical strand of theory of language and thought:

a minority view that sees poetic thought as a fundamental characteristic of the human mind
(Gibbs 1994:17)

The prosaic approach that I am working with has much in common with this "poetic mind" approach, although the different starting points and directions may result in different types of inferencing. The issue of continuity between the poetic and the prosaic will be developed as the thesis proceeds.

Gibbs, as a psycholinguist, has been responsible for a range of studies (reported in Gibbs 1994) that explore this 'poetic mind' view empirically. His research demonstrates that there are indeed different levels of metaphorical activation when metaphors are processed under different conditions. He finds that it is necessary to distinguish several temporal points in processing, from immediate reaction to more delayed interpretations of metaphor, and suggests that different theories of metaphor processing may be required

for the different processes that seem to be involved (Gibbs 1994; in press). Gibbs distinguishes

- comprehension - "the immediate ... process of creating meanings for utterances"
- recognition - "the conscious identification of the products of comprehension as" metaphor
- interpretation - "analysis of the early products of comprehension as tokens"
- appreciation - "aesthetic judgement given to a product"

(Gibbs 1994:116-117)

There is mounting evidence that on-line comprehension of metaphor does not necessarily take longer than comprehension of non-metaphorical language (Vosniadou 1989; Gibbs 1994; Chandler 1991; Janus and Beaver 1985), and this processing evidence should have knock-on effects for theory; for example, Kittay's theory of metaphor comprehension involves the identification of literal meaning before an understanding of metaphor is reached (Kittay 1987), and yet empirically it would seem that there is not time for this to happen. The theory of a 3 step process of metaphor interpretation is thus open to question. Similarly, Gibbs dismisses Sperber and Wilson's Relevance Theory approach to metaphor as "loose talk" (Sperber and Wilson 1986; Wilson and Sperber 1988), since this view also ultimately implies that extra processing is required beyond that needed for non-metaphorical language (Gibbs 1994:232). At the very least, such disjunctions between theory and processing results should suggest that studies at one or other level are not subtle enough. A recent paper by Guiora and Fein (1996) suggests a need to distinguish degrees of familiarity in metaphors being processed. They claim that familiar metaphors are more likely to be processed directly and less familiar metaphors are more likely to invoke the literal meaning of the metaphor. The gradable features of metaphor identified in this study may contribute to the search for theoretical subtlety that can inform, and be informed by, empirical research.

Gibbs' work has developed our understanding of different types of figurative language processing, but is limited by the psychological tradition of laboratory experiments he works within, and can be usefully supplemented with more naturalistic studies and consideration of everyday metaphor as sited within goal-directed interaction in context: the process aspect of a prosaics of metaphor.

2.3.3 Metaphor and knowledge representations

Lakoff and Johnson, and the cognitive tradition they have initiated, work from theory-level evidence to draw from metaphor (M-D) theory what I have suggested may sometimes be unwarranted conclusions about prosaic metaphor or metaphor in use (M-

U). By starting instead at Conceptual-Processing Level, from the nature of concepts and mental representations, I will show in this section how several promising developments in cognitive science can contribute to the development of prosaic metaphor theory.

The need in this study to investigate both language and thought in the metaphorical use of language can be assisted by taking what is essentially a processing level orientation, and viewing the domains underlying Topic and Vehicle, not as sets of features, but as complex knowledge representations (Keil 1979; Neisser 1987; Sternberg 1994; Vosniadou and Ortony 1989). A survey of current research in cognitive science yields the following possible types of representations, some of which are systematic, some less so:

Schemata

Encountering Topic and Vehicle terms in discourse may activate mental structures that are variously described as schemata, scripts, frames and mental models (see e.g. Ross and Spalding 1994; McNamara 1994). Common to all these is the idea that domains may not be taxonomically organised, as some metaphor theories require, but rather, in real human minds working in real contexts of language use, they may be thematically structured, containing organised information about related entities, actions, events and language.

Exemplar-based memory

Work on exemplar-based thought and memory (summarised in Medin and Ross 1989) suggests that what is activated may not be abstract, but linked to the specifics of earlier situated encounters. The presence of Topic or Vehicle in discourse may serve to recall previous knowledge, along with context-based information.

Knowledge from a range of domains

Research into speech processing emphasises the flexibility and range of activation in the human mind; for example, on hearing *trombone*, connections with *bone* are activated, as well as more musical schemata (Shillcock 1990). Since the Vehicle term is by definition anomalous in the on-going discourse context, it may well prompt wider activations across several potentially relevant domains of knowledge, including systems that overlap or conflict.

Re-created knowledge

The work of Rose (1993) and Schank (1982) on memory, and of Barsalou (1987, 1989) on concept stability and *ad hoc* categories suggests that conceptual domains are not stable and stored in memory prior to activation, but are (re-)created in processing, and are influenced by recent experience and by contextual factors. Lowe (1996) suggests that

such re-creation, as the work of the human imagination, can include sensory and perceptual information.

Theory-based concepts

Recent interest in explanation-based, or theory-based, concepts can also be extended to the activation of Topic and Vehicle domains in metaphor processing. This work is revealing how individuals conceptualise, classify and store information from their experience in ways that structure information, both internally and in relation to other world knowledge, through "explanatory theories" (Ross and Spalding 1994; Carey 1985; Keil 1989). When theory-based concepts are activated in discourse processing, comprehension is facilitated by the use of explanatory relations linking features of concepts.

Domains of Topic and Vehicle appear then not to be single unified domains underlying single lexical items, but more amorphous groupings of all types and levels of information and meanings that can be activated in discourse processing. In real-time processing, these domains will be constrained and influenced by discourse context and by what participants bring to the discourse. The richness and variation in this view of domains will not make for simple theory construction or empirical procedures, but is what is needed to address the language in use concerns of this study.

2.3.4 Metaphor processing as analogical reasoning

Distinctions between metaphor and analogy need to be made in both the M-D and the M-U paradigms, to distinguish between 'metaphor' and 'analogy' as devices and outcomes, and to consider the M-U processing level views that metaphor processing is some kind of analogical reasoning.

At the level of M-D theory, distinctions are made between metaphor and analogy (Vosniadou and Ortony 1989; Gibbs 1994) on several grounds. Analogy maps attributes and relations from one domain (usually called the source domain) to another (target domain), and is thus similar to metaphor. Vosniadou and Ortony (1989) distinguish metaphor from analogy by requiring of metaphor some incongruity between domains, whereas analogy can be a literal, within-domains comparison; Gentner (1989) requires that analogy maps relations rather than features across domains, although Vosniadou comments on the inherent difficulty of separating relations from what they relate (Vosniadou 1989). Another way of distinguishing analogy from metaphor is to consider the relative importance of the source domain to the interpretation - in novel metaphors at least, the Vehicle is carefully and deliberately selected and plays an important role in the

new understanding created by the metaphor. In run-of-the-mill analogies, the precise nature of the source domain is not very important, and the ideational understanding reached may be free of source domain content (Kittay 1987).

All these ways of differentiating metaphor and analogy suffer from the now familiar problem of assumed domain distinctions, once the security of theory is left. Somewhere between literal comparisons - *a raspberry is like a blackberry* - and figurative comparisons - *Juliet is (like) the sun*, we move from analogy to metaphor; the boundary is, as ever, misty.

At processing level, several writers take 'analogical reasoning' as underlying metaphor processing (e.g. Steen 1994). By this is meant some process of mapping of relations between domains. Such "structure mapping" (Gibbs 1994:239) may well account for part of what happens when participants in discourse make sense of metaphor, but, as I have suggested in the previous section, other mental processes and representations would seem likely to be involved as well. Analogical reasoning, in the sense of mapping relations between domains, is therefore seen as one possible aspect of active processing of prosaic metaphors.

2.3.5 Connectionist models of metaphor processing

"Cognitive" in its narrower sense is characteristic of the information-processing (I-P) paradigm of artificial intelligence, in which much of the work of Gibbs, for example, is set. The underlying analogy of the I-P paradigm is the brain as computer, an analogy now increasingly seen as inadequate (Rose 1993; Lowe 1996). One way forward has been to replace the analogue computer in this underlying analogy with parallel distributed processors (PDP), which operate in ways more similar to the functioning of the human brain. In this scenario, the mind/brain - computer analogy produces a connectionist model of human mental processing, in which information is represented by the activation of networks of pathways between nodes. Work in, or close to, metaphor has made use of connectionist models of mental processing (Chandler 1991; Holyoak and Thagard 1989; Gentner 1989).

However, even with this updating, the IP paradigm can still be seen as basically inadequate because human beings process meaning not information, making use of imaginations, prior experience and beliefs and judgements (Lowe 1996; Rose 1993). PDP may be a better metaphor for the mind/brain, but it is still only a metaphor; neurons are essentially different from nodes in a connectionist network, and memories are

different from activated pathways in networks. As we have seen in 2.3.3 above, key aspects of mind and memory reveal a much more complex picture of activation and processing.

Given these criticisms, a connectionist model of metaphor processing can still offer a useful analogy for concept activation in Topic and Vehicle domains as the spreading of impulses along pathways between nodes. As pathways are activated, so patterns of activation are created, representing conceptual domains. Chandler (1991) has attempted to produce a connectionist metaphor of metaphor processing, and work in artificial intelligence uses PDP networks to solve analogical problems (e.g. Holyoak and Thagard 1989). A connectionist analogy suggests some **important** properties of the activation of concepts:

- Activation of mental representations can **spread** as the result of various types of motivated links (e.g. sound resemblance, exemplar memory, sensory memory, contextual information)
- Spreading activation is controlled (i.e. concept domains are bounded) when no pathways are found out of certain nodes
- Because of spreading activation, the mind can successfully process **partial** or incomplete information
- Gradability is inherent in activation, because pathways can be differentially strengthened through multiple links across domains.

The spreading activation analogy can be built into a model of metaphor processing, and allows for a holistic, context-based view of language and thought, as required for this study. The analogy can further characterise metaphor comprehension as the interaction of activated pathways in two or more networks simultaneously, as Topic and Vehicle domains are processed. As a result, some, overlapping, pathways will be reinforced, while other pathways that do not overlap will be inhibited. The resulting pattern of reinforced pathways represents the understanding of the metaphor, clearly influenced by previous knowledge and experience.

2.3.6 A complex systems analogy of metaphor in use

The connectionist model oversimplifies because non-linear systems of information and meaning are reduced to pathways between nodes. A complex systems analogy allows a less idealised model, in which the information and meanings created by activation of 'domains' can be seen as interacting non-linear systems that produce the **simplicity** of the understood metaphor within the context of the on-going discourse.

2.4 Beyond the cognitive: review of literature on the impact of metaphor in discourse

The contemporary focus on cognitive aspects of metaphor seems to have thrown other aspects of metaphor use into the shade. However, there are signs that this eclipse may be temporary, and that more attention is beginning to be paid to the interpersonal and interactional (Edwards 1997; Gibbs, personal communication). In this section, I briefly review some key studies on the impact and function of metaphor, using the three way distinction set up in 1.5.4: ideational (cognitive), interpersonal and interactional.

Ortony (1975) writes of three major reasons for using metaphor: compactness, vividness and inexpressibility. Compactness refers to the ideational potential of metaphor for importing many ideas at once through the linking of Topic and Vehicle. Vividness refers to the selection of Vehicle term to construct a striking and memorable expression that will have an interpersonal as well as an ideational impact. The third reason to use metaphor is that it can express what would otherwise be inexpressible; this can also be seen as referring to both the ideational and the interpersonal, since values and attitudes may also be otherwise inexpressible.

Cooper (1986) focuses on the interpersonal as providing an answer to the question of why a speaker or writer might choose to employ metaphor, developing Cohen's idea that an important role of metaphor is the "cultivation of intimacy" (Cooper 1986:153; Cohen 1979). Intimacy can be both taken for granted and enhanced through the use of metaphor, which brings with it attitudes to the topic that are assumed to be shared, or are then available to be shared, between discourse participants. In an extension of this idea, sub-groups in society can be seen as using metaphor to establish in-group language and identity. Individuals can make use of shared repertoires of metaphor to membership themselves and exclude others; they may deliberately deviate from shared norms to express individuality or disaffiliation. This is an important idea in educational contexts where adult and peer language use, including metaphor, may play a central role in inducting children into various groupings, both socio-cultural (as members of a school and community with particular values) and technical (in various academic subject disciplines, e.g. children learn to be 'mathematicians' or 'historians').

Two empirical studies have been found that also make important points about the impact of metaphor (Drew and Holt 1988, 1995; Strässler 1982). Drew and Holt use conversation analysis techniques to investigate the use of idioms, many of which are metaphoric, in complaint sequences. They show that expressions such as *it was like banging my head on a brick wall* (Drew and Holt 1988:405) often work ideationally to

summarise the details of a complaint, while at the same time working interpersonally to indicate the speaker's attitude to the seriousness of the complaint. Interactionally, such idioms regularly occur at the end of a sequence of details and serve to initiate topic change. The figurative nature of an idiomatic expression, and, importantly, the recognition by participants of that figurative nature, serve to "remove the complaint from its supporting circumstantial details" (ibid: 406). A consequence of this distancing from detail is to render the idiomatically formulated utterance less open to question by other speakers. Drew and Holt suggest that such distancing through metaphor represents a seeking for affiliation in potentially hostile situations, where, for example, the other speaker has not sided with the complainant as explicitly as desired. The placing of the expression in the interaction suggests that the idiom serves to "bring speaker and recipient into some kind of alignment before changing the topic" (ibid: 412).

Strässler's study of idioms in English talk and texts (Strässler 1982) finds that idioms are mostly used to refer to other people or objects in the third person, as in the Drew and Holt example above. He too argues that in using an idiom a speaker conveys much more than ideational content. For example, in discourse contexts where there is a large power differential between participants e.g. patient and therapist, the lower status participant is less likely to use third person idioms, being restricted to first person idioms, and use of second person idioms appears to establish superiority. Idioms are seen as particularly amenable to use for evaluation, combining summarising with conveying attitude, in line with both Drew and Holt's conclusions and with Ortony's compactness thesis. Strässler comments on how use of idioms may carry a risk to interpersonal relations because they can be inappropriately strong in formulation.

These findings about the use of idioms will extend to metaphor as defined in this study, to the extent that they signal features worthy of close attention when classroom discourse is analysed. Attention needs to be paid to the content and sensitivity of choice of metaphor in terms of interpersonal impact, to the positioning of metaphor in sequences of interaction, and to the effect on the on-going discourse event.

2.5 Theories of metaphor: Summary

Chapter 1, Section 1.4 clarified the definition / identification problem for metaphor through separation of levels of analysis, and set out four elements as in need of attention:

- theory-level criteria to identify linguistic metaphor
- a model of the use of linguistic metaphor in discourse
- a model of the discourse processing of linguistic and process metaphors
- processing-level criteria to identify process metaphor

The review of the literature on metaphor theory and related fields has served to provide useful aspects for these four elements, which this summary now pulls together.

Theory-level criteria to identify linguistic metaphor

Domain incongruity has been established as the basic necessary condition for the identification of linguistic metaphor. This condition needs to be operationalised, with the notion of incongruity developed to take account of the possibility set out in 2.2.4 above that this may be determined by reference to community norms, to individual background knowledge or to etymology of lexical items.

A model of the use of linguistic metaphor in discourse

Several ways of describing the introduction of metaphor into on-going discourse were identified from the literature, each of which may be helpful in analysis:

- through the re-naming of the Topic
- through a comparison via a reduced simile
- through introduction of a new term and domain through which to interpret the Topic

While the first two are formal devices, operating at the level of the surface language, the third is ideational, in the sense of dealing with ideas (Lowe 1996), and will fit with processing-level evidence about domain activation, summarised in Section 2.3 above, through a complex systems analogy / approach. The third can collapse into either of the first two when the metaphor is straightforward.

A model of the discourse processing of linguistic and process metaphors

The distinction between linguistic and process metaphors embodies a distinction between active processing of a stretch of language as a metaphor. Linguistic metaphors are identified through their potential for metaphorical processing; some may realise this potential, and be interpreted in real-time through an active process of reasoning across the two distinct concept domains, while other linguistic metaphors may not activate metaphorical processing, with meaning is accessed directly. The category of process metaphor contains those instances of language processed across incongruent domains to reach some understanding of the Topic in terms of the Vehicle. The category of process metaphor will be more than simply a subset of linguistic metaphors whose potential is realised, since it will also include instances of language that might be judged non-metaphorical by an analyst working at theory-level, but which are in fact, for some individuals, processed metaphorically. The identification of "process metaphor" is clearly an empirical matter, and a very different operation from the identification of linguistic metaphor. The category is constructed anew for each individual during each processing

episode, and there is a major problem in finding observable behaviours from which metaphorical processing can be reliably inferred. In the second empirical stage of the study, I claim some evidence for process metaphor from Think Out Loud protocol analysis and from explicit discussion of metaphoricity by participants.

Active metaphor processing is seen as including activation of incongruous Topic and Vehicle domains, resolution of incongruity and construction of Vehicle-related meaning for the Topic terms. Empirical research reported in Section 2.3 has clarified the nature of information and meanings which may be activated when Topic and Vehicle items are encountered in discourse. The making sense of the incongruity across activated domains has been described in the review of literature as

- analogical reasoning
- the mapping of similarities
- the mapping / transfer of salient predicates
- the transfer of semantic relations
- the reinforcement and inhibition of relations.
- the emergence of understanding from the interaction of complex systems of information activated in the discourse context

Once again, each model can be useful, with the last collapsing down to the others in more simple instances. The role of social interaction in this process needs to be developed and included in a discourse model of metaphor processing.

Processing-level criteria to identify process metaphor

Process metaphor will be identified if there is evidence of resolution of incongruity across two domains. Since incongruity is gradable, some process metaphors will be more strongly evidenced than others.

2.6 Review of literature on children's metaphor production and understanding

I now move to review another set of published literature - empirical studies into children's production and comprehension of metaphor. Most of these studies have very different aims from mine, and investigate children's capacity with metaphor-as-device, as defined from an adult perspective. They do, however, shed some light on what makes for successful and less successful use of metaphor.

In reviewing this literature, it is important to maintain several types of distinctions that have already emerged as important for this study. Firstly, the device / use distinction must be kept clear, and secondly, explicitness about the analytic 'point of view' as either

norm / individual and adult / child is to be insisted on. In using terms such as *metaphor* and *metaphorical language*, it must be clear whether this is linguistic metaphor or process metaphor (Chapter 1, Section 1.4), and whether active metaphor processing is implied (Section 2.5 above). In many studies, linguistic metaphor used in tests is identified through a metaphor-as-device theory, and according to adult norms.

Pollio and Pickens (1980) report a series of studies with children aged 8 to 17 years that demonstrate differential developmental trends in four aspects of metaphor competence: production, preference, comprehension and explication. Explication and preference are only incidental to the empirical studies reported in this thesis; I proceed here with reviews of studies of production and understanding of metaphor. This literature is somewhat limited in applicability to the concerns of this study, in that very little attention has been paid to the role of discourse context and interaction, to the role of linguistic form, to metaphor in prosaic discourse as opposed to more poetic, i.e. active, strong metaphor, and to the implications of viewing metaphor processing from the child's point of view. However, the review will highlight the importance of children's previous knowledge in making sense of new metaphor, and thus indicate possible dangers and limitations of metaphor use in education, that may be present alongside the more frequently cited advantages.

2.6.1 Children's understanding of metaphorical language

The metaphorical use of language considered in this thesis includes that employed during the complexity of normal classroom interaction. The similarities and differences between this context and that of empirical studies, carried out for the most part in psychology laboratories, need to be borne in mind in order to assess the transferability of experimental results to the study of metaphor in the multi-level, multi-participant discourses of the classroom.

"Understanding" of metaphorical language can, as Gibbs points out (1994:116-7), include various different processes along a temporal continuum. As described in Section 2.3.2 above, Gibbs identifies four points on this continuum to label and describe: *Comprehension*, *Recognition*, *Interpretation* and *Appreciation*. Some small changes will make these distinctions even more useful and applicable to child studies. *Comprehension* and *interpretation* are retained as essential distinctions. Since child subjects are often unlikely to be able to explicitly identify and label metaphor, I will replace *recognition* with the somewhat broader *noticing*, occurring after comprehension, when a discourse participant reacts to the form or content of a linguistic metaphor, but without necessarily

classifying and / or labelling it as metaphor. The fourth type of mental process, which Gibbs labels *appreciation*, might be better characterised as *evaluation*, so as to broaden it to include other types of judgement e.g. about the effectiveness or clarity of the metaphor.

Understanding metaphor then includes (at least) four processes, of

- *comprehension*
- *noticing*
- *evaluation*
- *interpretation.*

The terms *understanding* and *making sense* are used from this point to refer to either comprehension or interpretation... with the more precise terms used where appropriate and possible. The comprehension / interpretation aspect of metaphor competence then can be seen as the ability to construct and/or retrieve possible meanings of linguistic metaphor and to select the most appropriate meaning in the light of the context of use, where these are likely to be non-sequential, overlapping processes. Development in this ability might then be seen to lie in development in the ease and sensitivity with which understandings are constructed and selected. Other aspects of language and cognitive development, such as expansion of the lexicon or changes in the amount and categorisation of knowledge of the world, will feed into this development of metaphor comprehension / interpretation skills. The existence of any specific core skill in metaphor understanding that is measurably independent of other skills might be queried, since metaphor comprehension / interpretation may be achieved through the application of a range of skills, none of which is essentially metaphorical or metaphor-related. The empirical studies do seem to have narrowed down the possibilities in this respect, partly through the deliberate control of variables, but also through continuing attempts to improve research methodology.

Since the late 70s, empirical studies have attempted to devise tasks and responses that better enable children to display their understanding. This has led to evidence of comprehension of metaphorical language in pre-school children, whereas earlier methodology that relied on verbalised explanations of metaphorical meaning (e.g. Piaget 1974) could only demonstrate metaphor interpretation in children of secondary school age and beyond. For example, Vosniadou et al (1984) used toys with four year olds who acted out their understandings of metaphors. Pearson (1990) used an elicited repetition technique with 3 - 5 year olds to measure metaphor comprehension by comparing

performance on the repetition of metaphorical, literal and anomalous sentences. The results show children processing the metaphorical sentences on a par with literal sentences, and with repetition of the anomalous sentences producing significantly more errors; three year olds performed as well as four year olds. Broderick (1991) tested, and found evidence for, the ability of 3 -5 year olds to understand abstract, concrete and literal similarities contextualised by various means including short stories, "comments, sound effects and pantomime" (Broderick 1991:71).

Such contextualisation of metaphors presented in comprehension testing marks another shift in research methodology towards greater validity. Although in many cases (e.g. Levorato and Cacciari 1992; Evans and Gamble 1988) the metaphors included in a study are selected through pilot work with adults, leaving a question mark over content validity that will be discussed shortly, it has been increasingly common to present metaphors through a more elaborated discourse context, usually a story (e.g. Levorato and Cacciari 1992; Reynolds and Ortony 1980; Vosniadou et al 1984). I disagree with Winner, who defends decontextualised comprehension tasks to the extent that they "reveal the kinds of similarity that children *generate* on their own" as opposed to "the kinds of similarities that children *recognize*" when metaphors are presented in context (Winner 1988: 44, her italics). Understanding metaphorical language in (discourse) context is much more than merely recognising pre-existing similarities; it too may involve generating possible similarities, and differences, in a combined cognitive and imaginative process of generation and selection.

The aims of this study suggest that published studies should be examined for their contribution to describing and explaining how the following impact on children's understanding of metaphor :

- the linguistic form of metaphor
- the content of metaphorically used language
- the discourse context of metaphor use.

Studies will also be reviewed for their contribution to describing and explaining developmental trends in metaphor understanding. A key aspect of this will be the role of previous knowledge brought to the processing.

The effect of linguistic form

Many of the studies reviewed refer to the linguistic form of metaphors but then confound it as a variable with information-content, so that changes in form are inseparable from changes in task demand as created by the amount, and sometimes the nature, of

information that the child has to process. This means that the effect of form on understanding is only partly investigated. For example, the study of Nippold et al. (1984) attempted to contrast the comprehension of "predicative metaphors" such as *the bird was a rainbow flying in the sky*, which they describe as having one Topic term and one Vehicle term, with the comprehension of proportional metaphors, with two Topics (1 of which is unstated) and two Vehicles, such as *the bird's nest was a piggybank that had no coins*. Clearly the information contained in the second type is more complex, in that, not only are two domains compared (*bird's nest ~ piggy bank*), but, within that comparison, there is a further, relational, link to be constructed between the two domains (*having no coins ~ having no eggs*). The difference between the two types in surface linguistic form reflects a much more crucial difference in information content, and thus in the complexity of the comprehension task. Not surprisingly, when tested through a multiple choice listening task, both 7 and 9 year olds found the second, proportional, type of metaphor more difficult to understand than the first. However, in the repetition task that was included as a control task, the predicative metaphors were found to be more difficult to repeat accurately than the proportional metaphors, apparently raising a question over the validity of repetition as a measure of comprehension, as advocated by Pearson (1990). Nippold et al suggest that the task demands presented by the forms of the two metaphors differ in the repetition and in the multiple choice tests. They point out that the relative clauses in the proportional metaphors contained information vital to interpretation, in contrast with the non-essential information encoded in the non-finite clauses of the predicative metaphors. In the multiple-choice comprehension task, subjects could ignore the final non-finite clause of the predicative metaphors, whereas in the repetition task these clauses could not be ignored. Difficulty in repeating the last clause accurately would be increased since understanding of the sentence could take place before the processing of this last phrase, which would then be less strongly entered into memory (Ellis 1994). Such an explanation potentially restores Pearson's case for the use of elicited repetition, provided the information processing demands are kept constant. In her study the metaphors were typically single clause and of the form NP- VP -NP- PP or shorter e.g. *the daisies stick their toes in the ground*. Of the 33 sentences included as examples in her paper, 5 do include *-ing* participle non-finite clauses, but she makes no comment as to how they were processed .

The apparent lack of close attention to syntactic form demonstrated in such studies may be a result of the area being explored in the main by psychologists rather than (applied) linguists. Broderick's study of canonical forms of metaphorical language in children's books, described in more detail in Chapter 4, suggests that, if comprehension testing

makes use of grammatical forms of metaphor that are less familiar or less frequently encountered, then the results produced could be taken as being on the conservative side, with children probably capable of much more than the tests demonstrate (Broderick 1992). However, the matter could be more complicated than this; different grammatical forms, especially verb as contrasted with noun metaphors, may well be processed in quite different ways. There seems, then, to be a need for more linguistically controlled studies that attempt to manipulate separately the variables of linguistic form and information-content to investigate the detailed effect of form on ease of understanding.

Winner (1988:49) reports other studies, which, through the form of the metaphorical language involved, seem to make the processing task more straightforward for children, and lead to better performance. Winner, Engel and Gardner (1980) used riddles and quasi-analogies. Reynold and Ortony (1980), and Vosniadou et al (1984), showed that children found similes easier to understand than predicative metaphors. Linguistic form can thus affect explicitness of information as well as the amount of information in a linguistic metaphor. Moreover, this can be multiplied, or otherwise affected, by discourse context, for example in the extra information provided by context or by the systematic use of metaphorical language.

Content factors in metaphor understanding

In processing a linguistic metaphor the receiver is faced with the task of finding or creating an understanding that is coherent with, and appropriate to, the discourse context. Success in achieving this for an individual is the core skill of metaphor comprehension and interpretation. As established in Section 2.5 above, such processing may involve retrieving stored meanings, or may be actively metaphoric in the sense of requiring an imaginative leap (Kittay 1987:270) between Topic and Vehicle domains to arrive at a coherent understanding of the metaphor within the discourse. In theory-level terms, successful active understanding of metaphor requires that children:

- ≈ realise (consciously or sub-consciously) that a metaphorical use of language is intended
- ≈ activate relevant properties and / or relations in the Vehicle domain from previous knowledge
- ≈ make ideational links between these and the Topic

The active processing of metaphor is open-ended and, once a minimum meaning has been found that leads to successful comprehension, individuals may still vary in the richness and appropriacy of the further interpretation they make. Measurement of

successful minimum comprehension can thus be separated from measurement of creativity or richness in interpretation. The probability of successful minimum understanding could be expected to increase with age, as could the range of types of metaphor and conceptual domains successfully comprehended, and interpreted.

It appears that sometimes children (and no doubt adults, too) fail to realise that a metaphorical understanding is appropriate. Wales and Coffey (1986), for example, found some evidence that children could identify salient attributes of the Vehicle terms in cross-domain metaphors and were "capable of apprehending the domain correspondences which these expressions establish", but yet still frequently failed to interpret such metaphors and similes metaphorically (Wales and Coffey 1986:91; Gibbs 1987)

Not only, as Wales and Coffey found, are children sometimes not aware of the need for a metaphoric interpretation of language that they encounter, but they may well produce a meaning that is not wholly appropriate in terms of the level and number of mappings made between Vehicle and Topic. Children encounter a range of types of metaphor, and they need to develop the skills to reach appropriate understandings of the different types. Knowing which aspects of Vehicle are relevant to the Topic is centrally affected by existing knowledge. A study by Evans and Gamble (1988) demonstrates this very nicely. Basing their scoring of "correct" meanings on adults' interpretations, their study showed an increase in appropriate interpretations from 8 to 12 years old. The most frequent 'errors' in interpretation they found were of a type in which children picked on attributes salient to themselves, but not to adults, to use in metaphor interpretation e.g. when asked to interpret *her skirt was a balloon as she walked*, the property *bright red* was given as an attribute for *balloons* and then transferred to the *skirt* in interpretation. It is easy to imagine how the child subject's previous experience had led to *bright red* becoming an important property of *balloons*, and also how the attribute that was salient - being filled with air, floating or blowing about in the wind - might not have featured in their experience with *balloons*. This particular example also suggests that knowledge and experience of the Topic *skirts* might have helped interpret the metaphor; a child may never have noticed what happens to skirts on windy days. In fact, since the metaphors were not presented in any discourse context beyond the sentence, reaching an adult interpretation of the metaphor would require inferring the windy day schema from the juxtaposition of *skirt - balloon - walked* and their activated properties and relations. If a discourse context had explicitly activated that schema, the child might have reached the adult interpretation. The methodology of a study can thus be seen to have a potentially

strong influence on results, which may then be taken as indicative of developmental trends.

Both extent of domain knowledge, and relative salience of what is known, affect the probability of successful understanding. Keil (1979, 1983) shows that, once degree of domain knowledge is removed as a variable, the type of knowledge (abstract/ concrete; general /specific) becomes less important as a factor. Metaphor comprehension follows, and can be predicted by, the acquisition of domain distinctions. Basic level categories are among the first distinctions made and should therefore provide easily comprehended metaphors. Keil (1983) found that 5-9 year olds could explain the meaning of sentence metaphors out of context for domains they had already differentiated. He suggests that metaphors emerge on a field-by-field basis e.g. animate/inanimate before animal/human. The work of Carey (1985) suggests that asymmetry in cross domain attributions may have an effect on metaphor comprehension.

When domain knowledge is controlled for, understanding may still be affected by the nature of the domain correspondences that need to be made. For example, interpretation of *dancing dinghies* (author's data) may reflect perceptual similarities (shape of dancers and dinghies), relational correspondences (moving up and down in relation to some other medium or surface) or psychological links established as connotations in the speech community (happiness in sunshine reflected on the moving water). Winner, taking a similarity view of metaphor processing, classifies the types of similarities that might be relevant to children's use of metaphor into "sensory" and "nonsensory" (Winner 1988: 64). She then divides sensory metaphors into those that link two objects (or presumably events etc) perceived with the same sense - "within modality" - and those that make links across modalities "cross-modality" (Winner 1988:65) Non-sensory metaphors include those that link relations between domains and those that make psychological-physical links. Winner suggests that developmentally, sensory metaphors are understood before non-sensory metaphors. However, once again it seems that, when domain knowledge is ensured, non-sensory metaphors can be understood by young children (Keil 1985); they can make relational mappings between domains (Gentner and Stuart 1983; Dent 1984; Nippold et al 1984) and can deal with abstract metaphors as well as concrete ones (Broderick 1991). Not only, as Vosniadou (1987) points out, are perceptual attributes and relational attributes of entities very often interdependent, but also the tendency of young children to prefer thematic structurings of categories reported by Markman (1987) militates against the probability of a simple developmental move from perceptual metaphor to relational metaphor comprehension. Again, children are likely to employ the

relations that are known and salient to them in interpreting metaphors, and the empirical evidence of increasing competence with relational metaphors reflects their increasingly sophisticated understanding of the relations between and within concepts, and increasing familiarity with a wider range of domains.

Gentner's work on the nature of scientific metaphors produces some clues as to other possible developmental aspects of metaphor understanding (Gentner 1986). Precise mappings between clearly defined "object nodes" (Gentner 1986: 108) are proposed as key features of the explanatory analogies that lie at the base of scientific metaphors, in contrast to the richness of potential mappings in more expressive analogies such as those in poetic metaphors of literature. Furthermore, the precise mappings of scientific metaphors tend to be higher-order in the sense that they are both more abstract and more general than the richer and less predictable mappings of poetic metaphors. So when *melted butter* is linked in such an analogy with *volcanic lava* (author's data), the relational mappings are at the general and abstract level of *melted by heat / bubbling / moving in a certain way* rather than the more specific or concrete relations, such as *colour / smell / use / origins*. Gentner suggests that individual development in the use of scientific metaphors may proceed from the concrete to the abstract (1986:128).

Having reviewed the impact of previous knowledge on minimum comprehension, a further aspect of metaphor understanding is "elaborateness of comprehension" (Siltanen 1990:6) i.e. finding appropriately rich interpretations of comprehensible metaphors, exploiting the potential of metaphors. Siltanen seems to suggest that increased elaboration is due to "greater world and word knowledge and because of the ability (of 12 year olds and over) to construct the most complex categories" (1990:7). The complex categories are those that are relationally structured. I have found no further studies that attempt to measure this more open-ended aspect; all those mentioned above seem concerned with the ability of children to reach consensual or conventional understandings, and those which rely on multiple choice tasks to measure comprehension, verbal or non-verbal, cannot measure such creativity at all. Many of the metaphors selected and constructed for use in these studies also do not lend themselves to rich interpretations. Naturalistic data may yield richer interpretations that at least give some idea of what needs to be measured in considering how children deal with the potential unfinalizability of metaphor.

The effect of familiarity

Familiarity may work at several levels to influence successful understanding. At the lowest level, variation may occur in familiarity with particular linguistic forms of metaphor, and with particular Topic-Vehicle links. At a higher level, subjects will vary in their familiarity with Topic-Vehicle links that occur systematically at local, discourse or global level. This may be genre-related, since, if texts from certain discourse genres, including media texts such as soap operas, make greater use of metaphors than others, children may experience different degrees of exposure to metaphorical language, as well as different experiences of having their attention directed to such language.

One outcome of this may be variation in the degree of awareness of the appropriacy of metaphoric processing in particular discourse contexts. I have found no studies that attempt to measure the impact of familiarity on metaphor understanding. However, there is some suggestive evidence from studies of language-impaired children, especially in the area of semantic-pragmatic disorders, who often do not seem to process linguistic metaphor metaphorically (Abkarian et al. 1990; Hampshire 1996). Non-language impaired children would seem to develop metaphor competence at least partly through the influence of exposure to metaphor in discourse i.e. familiarity is a factor influencing development.

Review of studies on children's understanding of metaphor - summary

The review of the literature on children's understanding of metaphor has covered the effects of linguistic form, of the amount of information and the explicitness with which it is encoded, of metaphor familiarity, of children's background knowledge in the shape of the nature and amount of their domain knowledge, and the still only partly clarified skill of finding rich, elaborated links across known domains. The information revealed by the empirical studies, while clearly limited, may help in understanding the process of discourse-situated metaphor comprehension.

Marschak and Nall (1985:64), quoting Vosniadou and Ortony (1983), remind us that metaphor understanding results from complex interaction between the metaphorical language, the conceptual content of the language, and the language in its discourse context.

- ♦ In classrooms, as in other discourse contexts, metaphor comprehension is only rarely likely to be dependent on the content of a single sentence as in these studies, but in most instances is likely to be situated in, and supported by, rich discourse contexts that assist the activation of possible meanings and the elimination of the

inappropriate. Immediate feedback on success and error will usually be available from fellow participants in the discourse, and on-going interaction may spark off new ideas in a way that an individual child facing an experimenter is **unlikely** to experience.

2.6.2 Children's production of metaphor

The process of producing deliberate metaphor requires the selection of a Vehicle domain and lexical item(s) from the related semantic field to juxtapose with a given Topic, within a particular discourse context, to achieve a particular communicative purpose. The choice of domain and lexis can vary in appropriacy relative to both communicative purpose and aspects of the discourse context, such as shared background knowledge between participants. There are too conventional ways of using metaphorical language, both novel and frozen / conventional, that a child will acquire. While, for adults, the production of metaphorical idioms may be a quite different process from the creation of novel metaphors, children may produce idioms metaphorically at some stage, either initially or, following the U-shaped curve analogy of other first language acquisition processes (Karmiloff-Smith 1987), at an interim stage, before they 'freeze'. Alternatively, some idioms may be acquired in the frozen state and stay that way.

Appropriacy of metaphor use in discourse requires knowledge and skills such as awareness of an appropriate point in a text or conversation to use metaphorical language effectively: for example, the use of idiomatic language to summarise in potentially negative discourse situations (Drew and Holt 1988).

What then can the literature tell us about the development of these production aspects of metaphor competence? Two central issues appear to dominate the literature on young children's metaphor production: firstly, attempts to assess whether utterances that appear to be metaphorical do have some genuine metaphoricity, and secondly, the apparent decline in the production of metaphoric language during the primary school years. Alongside these two major issues, the literature offers some clarification of the nature of developmental differences in types of metaphorical language produced, and of changes in the function of metaphorical language used by children (Pollio and Pickens 1980; Winner 1988; Marschak and Nall 1985; Vosniadou 1987(a)). These will be discussed in turn.

Since this study is concerned with children in the later primary years, I will summarise the continuing debate on the status of very young children's metaphor-like utterances. There is an increasing consensus (Vosniadou 1987(a); Marshak and Nall 1985; Paprotté 1985) that the early renamings, over extensions and symbolic-play metaphors (Winner

1988) produced by pre-school children should not all be classified as metaphorical uses of language but rather as "pre-cursors" of metaphor (Vosniadou 1987(a): 873; Paprotté 1985: 439). If a necessary criterion for an utterance to be considered metaphorical is the crossing of established domain boundaries, then over-extensions e.g. seeing a dolphin and saying *fish*, or a symbolic-play metaphor e.g. *this pillow is my space ship* (Marjanovic-Shane 1989), although they might be metaphorical if produced by adults, are probably not metaphorical for the children who produced them. In the first example, a separate domain for dolphins etc has not been established, and, in the second example, the function of the child's utterance is to relabel objects in the imaginary world he is creating i.e. to shift the object into the other domain for the time span of the game. "Real and imagined world do not yet seem to be simultaneously present in the child's mind." (Elbers 1988: 595). In Clark's terms (Clark 1996), the talk moves from Layer 1 to Layer 2, whereas metaphor would involve the use of Layer 2 talk to comment on Layer 1 topics. Young children's creative use of the language they have acquired, and their ability to perceive similarities in different objects or events, present in these early proto-metaphors, are essential skills in the on-going development of metaphoric competence.

The apparent decline in the production of metaphors as children move through the primary years observed in earlier work (e.g. Billow 1981; Gardner, Kirchner, Winner and Perkins 1978) has been questioned on various grounds: it may be a result of the decline (or rather, from my own observations, a change) as the child gets older, in the types of fantasy play that, in the pre-school years, produce symbolic-play metaphors (Elbers 1988); it may reflect a change in the types of metaphors produced and thus in the number counted by adults as being metaphorical (Vosniadou 1987(a)); it may be a result of a decrease in the number of naturalistic studies and a swing towards experimental studies, thus losing the metaphors that children use with each other in name-calling, in establishing rights etc (Elbers 1988:599); linked with this may be the increasing use by researchers of children's written production (e.g. the work of Pollio and Pickens 1980) as a source of metaphorical language rather than their spoken production. Winner suggests that early, often perceptual based metaphors, seem to be replaced increasingly by analogies, especially when used in explanation (Winner 1988). Mendelsohn, Winner and Gardner (1980, reported in Winner 1988) had 7 - 11 year old children explain phenomena such as how a radio works, or why a flower wilts, to a puppet from another planet (sic) and found that children used analogies freely, although they were 'safe' comparisons rather than more apparently original ones that younger children might produce.

A focus on the evolving function of children's metaphorical uses of language helpfully complements such findings. While early proto-metaphors often function to fill lexical gaps, Elbers' study of the production of metaphoric compounds suggests that they are used by 8 -10 year olds not only to express difficult concepts with precision (in line with Ortony's compactness thesis 1975), but also in the assimilation of metaphorical idioms through recreation of their metaphoricity, and for humour (Elbers 1988). These language-related functions of metaphor reflect a change in the nature of metaphorical language too, away from the perceptual or action-based metaphors of early childhood towards language-based metaphors, in the later primary age range with which I am concerned. Elbers' suggestion that some children's metaphors appear to be extensions of metaphorical idioms produced in the process of assimilation through re-creation, suggests a useful category for the analysis of classroom data. One of her examples is the child who responded to an adult calling his baby brother "*a little treasure*" with statements such as *your mouth is full of pearls, your ears are full of gems, your nose is golden..* (Elbers 1988:612). Further information on the acquisition of idioms comes from a study by Pollio and Pickens (1980), in which they assessed the use of figurative and idiomatic language in written compositions of children aged 8 -17 years. They found much more "frozen" metaphorical language than "novel", with the gap widening after age 13, and with a somewhat U-shaped curve for frozen metaphor production over the range, with its lowest point at Grade 6 (i.e. age 11/12 years). They explain this phenomenon as perhaps being due to children seeing both novel metaphors and idioms as "strange" language that they use quite frequently; from the age of 11 or 12, the distinction between novel metaphors and idioms is clarified, with formerly strange metaphorical idioms becoming familiar and idiomatic for the children too, and used more frequently, while novel metaphors are used less frequently but perhaps more appropriately.

No information has been found on developmental changes in the linguistic form of productive metaphors. Metaphors produced by children in the data collected for this study should add to the very scant information that seems to be available about the development of metaphor production skills.

2.6.3 Limitations of the research studies reviewed

- Comprehension studies often only use sentence level metaphors of a limited range of linguistic forms, and with the most extensive discourse context provided being a short narrative.

- Where linguistic form is taken into account, it is often confounded with the information-processing demands of the content imposed by the form. Likewise, production studies yield little information on the frequency of production of different linguistic forms of metaphor.
- The effect of familiarity or mediation in the use and understanding of metaphors has not been studied.
- The development of creativity in the interpretation or construction of metaphor is not attended to in the empirical studies.
- The process of understanding or producing metaphor do not appear to have been studied other than through product or end-point measures. Moreover, having discovered that explication of metaphors placed a large burden on young children and concealed their competence, with the exception of a few studies (e.g. Elbers 1988) the voices of the children themselves seem to have disappeared from the research process. In the second empirical investigation in this study, information provided by the children will be a valuable resource in understanding how they come to use and make sense of an increasing range of metaphorical language.

2.7 Conclusion

2.7.1 Children and metaphor in discourse context

The limitations of research studies summarised above suggest that this study has an important contribution to make to the field by investigating metaphor at work in more natural, and more extensive, discourse contexts. The applied linguistic perspective should also contribute to our understanding of links between linguistic form and metaphor use.

Research shows clearly that development in metaphor capacity is linked to conceptual and language development, in terms of the depth and complexity of resources available to draw on in producing or understanding metaphor. In order to understand or produce metaphor in discourse, a child needs to have available sufficient domain knowledge, especially Vehicle knowledge and especially relational knowledge, and to be able to select appropriate, and appropriately rich, domain attributes and relations for transfer. Age, level of conceptual development and experience will affect each of these.

A language in use perspective also suggests that what, from available previous knowledge, is activated will be affected by the discourse context, by the preceding and

on-going interaction, by perceptions of discourse goals, and by shared and individual understandings already developed in the discourse event. In particular, the literature has suggested that, in laboratory studies, children may have a problem in recognising that a metaphorical interpretation is needed. The extent to which this also applies in discourse will be interesting to investigate.

2.7.2 Dimensions of metaphor

The literature reviews have produced the following as features of linguistic metaphor that can be graded:

- incongruity of Topic and Vehicle
- richness of links between Topic and Vehicle
- paraphraseability
- Topic familiarity
- Vehicle familiarity
- systematicity - in the language / in language use in the discourse event

Further gradable features will be added, and the role of these in metaphor description elaborated in the next chapter. This will lead to the construction of sets of identification criteria, to placing boundaries on the category of linguistic metaphor, and to describing possible grammatical and interactional forms that linguistic metaphor can take in discourse.

CHAPTER 3

IDENTIFYING AND DESCRIBING PROSAIC METAPHOR

3.1 Introduction

This chapter pursues the task of producing a theoretically adequate framework that will serve the identification and description of prosaic metaphor in discourse. Application of the basic necessary conditions of Topic~Vehicle incongruity, established in Chapter 1, to discourse data will identify a very broad set of language uses that needs to be bounded in various ways to reduce to 'linguistic metaphor', and I begin the chapter by setting out the procedures and conditions for doing this. In Section 3.2, I argue that a prosaic approach requires identification through the application of necessary conditions, together with elimination procedures and the application of explicit boundary conditions. I suggest further that Preference Conditions can be used to describe the category of linguistic metaphor. Section 3.3 sets out these conditions in detail.

The descriptive framework is designed to work both ideationally, on the content of the Topic and Vehicle terms, and formally, on the grammatical form and relations of metaphors. Section 3.4 produces the content descriptors by drawing up a set of gradable dimensions of linguistic metaphors, and an initial check for adequacy is carried out in Section 3.5.

In Section 3.6, I develop a grammatical framework to describe the form of linguistic metaphors, describing the internal grammar of Vehicle terms, the external grammar of the Vehicle in a metaphor, and the formal linking of a metaphor to the surrounding discourse. Sections 3.7 and 3.8 pick up grammatically-generated identification problems, establishing procedures for identifying verb and preposition Vehicles in discourse data.

3.2 Defining, knowing and describing metaphor

3.2.1 Identifying linguistic metaphor in discourse

What does it mean to know what a game is? What does it mean, to know it and not be able to say it? Is this knowledge somehow equivalent to an unformulated definition? So that if it were formulated I should be able to recognize it as the expression of my knowledge? Isn't my knowledge, my concept of a game, completely expressed in the explanations that I could give? That is, in my describing examples of various kinds of game; shewing how all sorts of other games can be constructed on the analogy of these; saying that I should scarcely include this or this among games; and so on.

(Wittgenstein 1953: 1-75)

There is an important mistake of method in seeking an infallible mark of the presence of metaphors.. Every criterion for a metaphor's presence, however plausible, is defeasible in special circumstances. (Black 1979:36)

Black, then, seems to be saying that there are no necessary and sufficient conditions for something to be a metaphor, just as Wittgenstein (1953) had argued that there are no such conditions for something to be a game. Perhaps metaphors, too, are related by family resemblances, as Wittgenstein claimed games were. (Ortony 1979:5)

In this respect, the metaphor issue resembles other language categorisation problems:

gradation is a fact of language, and in seeking discrete classes we are in danger of misrepresenting the nature of the native speaker's knowledge. (Pawley and Syder 1983:212)

I have so far been using the term 'metaphor' as if it referred unproblematically to a category, and have suggested that writers on 'poetic metaphor' can often get away with this because they can carefully select non-controversial examples of category members. However, as the above quotes from Black and Ortony suggest, this sleight of hand may cover up a more complex situation in which set-theoretic category membership criteria are inappropriate. In the move to prosaic metaphor and the identification of linguistic metaphor in discourse, the situation becomes more complicated still, since the new category of prosaic linguistic metaphor is being created through the process of setting up definitions and identification procedures. There is no guarantee that the types of thing I am trying to put into this category can be fitted together in any convincing way, i.e. it may not be possible to construct a coherent category of prosaic metaphor. The task of devising a theoretical framework for this putative category, applying it empirically in the analysis of data, and evaluating its adequacy becomes central to the theoretical part of this study.

The analogy between metaphors and games will help get started on the task. Metaphors, like games, are pervasive in human society; they are social and cultural in their use and invention. New media, such as the video and CD-ROM, give rise to new types of games; new situations lead to new metaphors: for example, the privatisation of public utilities produced the new metaphor of *fat cats*, to refer to directors with huge salaries. As categories, both "games" and "metaphors" are extendible and unpredictably open. There is wide potential for activities to be interpreted as games, even though they might not have been originally intended as games. As with metaphoricity, the "game-ness" of a game depends to a large extent on how it is actually used. In his discussion of games, Wittgenstein points out, that like members of the same family, there is

a complicated network of similarities overlapping and criss-crossing: sometimes overall similarities, sometimes similarities of detail. (Wittgenstein 1953:1-56)

but that there is no property that is common to all. By following the 'game' parallel, the prosaic metaphor identification problem can circumnavigate the insoluble issue of finding a watertight definition and set about the task of identification through processes of analogy, exclusion and description.

A further problem then emerges: which initial, prototypical cases of metaphor are to be used analogically to locate other examples? The only starting point seems to be metaphors as products of an M-D approach; metaphors taken as typical when metaphor is seen as a "*device*". A first trawl through the data to find samples of talk that 'look like' typical M-D metaphors will produce a set of potential linguistic metaphors, which can then be examined from the perspective of the discourse context, including likely knowledge and assumptions of participants, to establish that domain incongruity is justified and to exclude doubtful cases. To avoid the possibility of inappropriate inclusion of stretches of language as metaphor, by including incongruities that arise from other aspects of the discourse context, Kittay (1987:84) suggests checking possible candidates for linguistic metaphor against the following contra-indicating circumstances:

- the speaker is making an error
- speaker and listener are communicating within a constructed discourse world, in which the language is not metaphorical although it may appear so when viewed from the outside.

The remaining set of linguistic metaphors can then be described linguistically, ideationally and interactionally. Figure 3.1 summarises identification procedures for prosaic linguistic metaphor. It is immediately clear how important it will be, especially in the last two steps, to be explicit about how decisions are made, since they will be sometimes arbitrary, or at best "motivated" decisions (Lakoff 1987).

Figure 3.1 *Identification procedures for prosaic linguistic metaphor*

- | |
|---|
| <ol style="list-style-type: none">1. trawl through the data looking for metaphor-like uses of language2. use the necessary condition of domain incongruity to identify a set of potential linguistic metaphors3. remove as non-metaphors, apparent incongruities that arise from error4. remove as non-metaphors, apparent incongruities that arise from shared understandings within the discourse context5. impose boundary conditions to exclude certain types of potential metaphors from the set |
|---|

3.2.2 Describing linguistic metaphor with preference conditions

Wittgenstein's notion of family resemblances, described above for games, has been developed in various forms, including prototype theory (Rosch 1978), radial categories (Lakoff 1987) and preference rule systems (Jackendoff 1983; 1992). Each of these attempts to provide criteria for membership of categories in which some members are better examples of membership than others - they are central or prototypical members. Preference rule systems have a set of preference conditions that are *necessary*, *typical* or *graded* as criteria for category membership. They are claimed to be able to account for family resemblances and for the occurrence of prototypes, and clusters of features can describe particular types of category membership (Jackendoff 1992). Jackendoff has applied preference rule systems to semantics and musical cognition (1983); Spolsky has applied a preference model to second language learning (Spolsky 1989), and Hickey (1993) to child first language. The approach adopted here to the task of categorising metaphor in discourse resembles a preference rule system, but with the additional constraint of boundary conditions.

3.3 Identification procedures for metaphor in discourse: details

3.3.1 Trawling to find metaphors analogically by form

In the first stage of identifying linguistic metaphors, I work analogically from M-D theory to find stretches of talk that 'look like' metaphor as described in the metaphor theory literature. In preference-rule terms, these are 'typical' (M-D) metaphors, and deciding which metaphors to take as typical reveals assumptions made by many writers working at the theoretical level. We might expect that a candidate group would be those metaphors selected by theorists to illustrate their discussions, and examination of these produces the following set of typicality conditions:

- T1 The Topic term is stated explicitly, or its referent is visible in the discourse context to both producer and receiver
- T2 The form is not negative : *Juliet is the sun* is more typical than *I am not a smile* (Sylvia Plath)
- T3 The Vehicle domain is (assumed to be) familiar to both producer and receiver
- T4 The producer intends the utterance to be interpreted metaphorically
- T5 The high level of incongruity between Topic and Vehicle makes it likely that the receiver will interpret the stretch of language metaphorically.
- T6 Certain syntactic forms are typically used, in particular the *A is B* form.

3.3.2 Necessary conditions

The basic necessary condition for linguistic metaphors (after Kittay 1987) has been established as the existence of an incongruity between the domains of a lexical item (the Vehicle) used to refer to some other idea (the Topic), which may or may not be explicitly lexicalised in the stretch of talk. The incongruity needs to have the potential to be resolved and to produce an understanding of the Topic in terms of the Vehicle. Identificational criteria are thus shifted on to the identification of incongruity between underlying domains, which, as established in Chapter 2, are collections of various types and levels of information and meanings that may be activated on encountering the Topic and Vehicle terms. Domains activated in discourse contexts are thus unavoidably situated within individual minds, deriving from past experiences and knowledge. However, in practice, generalisations may have to be made about domains averaged across individuals in order to identify linguistic metaphors; implications of this are dealt with in 3.3.3 below. Basic necessary conditions for metaphor can now be set out, (drawing on Kittay 1987):

Figure 3.2 Basic necessary conditions for prosaic linguistic metaphor

A stretch of language is said to be a linguistic metaphor if

N1 it contains reference to a Topic domain by a Vehicle term (or terms)

and

N2 there is potentially an incongruity between the domain of the Vehicle term and the Topic domain

and

N3 it is possible for a receiver (in general, or a particular person), as a member of a particular discourse community, to find a coherent interpretation which makes sense of the incongruity in its discourse context, and which involves some transfer of meaning from the Vehicle domain.

These conditions will produce a very broad category that will include many stretches of language, including metonymy, idioms and extended meanings. As pointed out earlier, the unpredictability of children's interpretations of language makes it important for a study of educational discourse to have available such a broad category, in order not to miss any of the metaphorical language opportunities open to children.

3.3.3 Excluding incongruities that arise from errors

Phonological and lexical errors may produce stretches of talk that may look something like typical M-D metaphor. For example:

a slither of rock

the apostrophe becomes before the S

Such errors arise from lexical accessing, rather than from particular lexical choices, and are thus omitted from the set of metaphors.

3.3.4 Discourse context and metaphoricity

Participant-relevant domain criteria

Following from the discussion of Black's work in Chapter 2, Section 2.2.4, there appear to be (at least) four sets of criteria by which domain incongruity, and hence metaphoricity, can be identified. In this section, I demonstrate how the nature of the discourse context being researched motivates a choice between these different sets of criteria.

A stretch of language can be identified as metaphorical:

1. on etymological criteria: e.g. *salary* can be said to be metaphorical because it originally referred to salt given to Roman soldiers.

Metaphoricity is a matter of history.

2. relative to speech community norms: e.g. *hot spells* is not a metaphor because that is how the concept is normally encoded, with no incongruity apparent to producers or receivers.

Metaphoricity is a matter of convention and probability.

3. relative to individual background knowledge: e.g. *hot spells* is a metaphor because the particular child links it to *witches*.

Metaphoricity is a matter of individuality and experience.

In addition, processing evidence would allow identification of metaphorical language

4. relative to what is activated by an individual on a particular occasion: e.g. *I can read your lips* may or may not be a metaphor depending on the activation of *reading* as symbolic and thus incongruous with *lips*.

Metaphoricity is a matter of activation during processing

When theorists use decontextualised, constructed or selected non-controversial exemplars of metaphors, individual knowledge and processing (as in 3 and 4) are assumed to be representative of shared norms (as in 1 and 2). In theories of metaphor

such as Black's, and often in empirical studies based on them, statements that appear to be linked to 3 or 4 are often based on criteria 1 and 2.

The aims and methodology of a research study can motivate different choices of identification criteria. A researcher who wishes to construct examples of metaphor and non-metaphor in order to test subjects' competence with metaphorical language in some way can work with non-controversial central examples (for which 2 and 3, and possibly 1, coincide), discarding borderline cases at the piloting stage, and only need general criteria, related to etymology or community norms, to classify sample stretches of language as metaphorical. On the other hand, in this type of research when it is required to identify metaphors in text or talk more precise criteria are needed, both for what counts as metaphor, and for what does not count as metaphorical, facing up to the problems of borderline cases explicitly. Not to do so would risk losing potential candidates for metaphor, and, by preventing replicability, would risk invalidating the study.

In my particular study, etymology is of no central concern, except in so far as it may be assumed to be common knowledge that would be subsumed under speech community norms of 2.

- ♦ I thus include as linguistic metaphors all those stretches of language that satisfy criteria 2, where the speech community includes adults and children i.e. those which, according to my judgement of those current speech community norms, triangulated where possible, include a potential domain incongruity.

Where possible, category boundaries will use what is known of children's domain developments from work such as that of Carey (1985) and Keil (1983). The relation of 3 to 2 is of concern, since the role of metaphor in equipping children with adult cultural norms is to be investigated. The set of metaphors identified by criteria 3 would be those that, with knowledge of the individual discourse participants, seem likely to be processed metaphorically. Metaphors that can be identified using these criteria will also be included, although this last set is grossly underdetermined; processing evidence, think-aloud protocol analysis, and developing children's explicit awareness of metaphor may allow it to be determined more fully in a move via generalisation and abstraction from 4 to 3 with respect to the specific group of children involved in the study.

Constructed discourse worlds

Constructed discourse worlds include the fantasy worlds of the theatre, stories and children's play. The example used in Chapter 2 from the 3 year old child, *this pillow is my spaceship*, uttered while playing at being a spaceman and using the furniture to construct the play world (Marjanovic-Shane 1989), demonstrates how a stretch of language that might, on the surface, look like metaphor, is better seen, within the shared discourse world constructed in the play context, as a relabelling.

Constructed worlds also include technical discourse worlds where lexical items have an agreed specific sense different from the non-technical e.g. the use of *difference* (*between 6 and 4 is 2*); *simultaneous* (*equations*); *make* (*2 and 3 make 5*) in mathematics. In identifying what is to count as metaphor, decisions will need to be made as to which uses of language in these technical worlds are considered non-metaphorical, relative to participants. Educationally, the child can be seen as undergoing a "cognitive apprenticeship" in the technical world and its discourses (Seely Brown et al. 1995: 301), and so a researcher needs to be aware of the possibility of a child making inappropriate and inaccurate metaphorical interpretations of technical language.

3.3.5 Boundary decisions

The need to have identification procedures that apply across the complexity of prosaic discourse presents a further problem when we move beyond uncontroversially distinct domains that produce metaphors such as *Juliet is the sun*, and deal with borderline cases of metaphor, where there might be disagreement on categorisation. The source of disagreement is the location of boundaries of Topic and Vehicle domains, in terms of what exactly is "taken to be salient for that language community" (Kittay 1987:19) or for participants in specific discourse events. For example, I might claim that "in" in *How many 9s in 909?* (school data) is being used metaphorically because the conventional domains of the Noun Phrases collocated with "in" are objects and containers, and numbers and physical objects/containers belong in clearly distinct categories. Someone else might argue that numbers have become conventional categories to be linked with "in" and so there is no possibility of metaphor. What we argue about is the, largely intangible and unmeasurable, degree of conventionalisation of categories and its relation to how we, as individuals, think. Resolution of conflict between two different assessments of what is conventional, and the resulting uncertainty over domain distinctiveness, requires the imposition of category boundaries that are to some extent arbitrary, in order to proceed with attempts to delimit and categorise metaphorical language.

When grammatical form is taken into account, further boundary issues arise. Verb metaphors provide a particularly interesting challenge in the identification of metaphor. It is uncontroversial and straightforward to postulate the possibility of incongruity between two conceptual domains underlying highly specific Noun Phrases as in examples such as

the rottweilers (=barmaids) behind the bar (author's data, adult)

when the discourse makes no references to dogs,

a dead rainbow (author's data, 7 year old).

Verb metaphoricity, on the other hand, needs to rely on judgements made about collocated Noun Phrases and their domains, and thus seems particularly open to question and disagreement. The best guard against such potential problems seems to be explicitness in respect of those judgements, as will be illustrated in Sections 3.7 and 3.8 .

As the identification procedures for linguistic metaphors in the corpus of data are used, boundary decisions will be explicitly recorded. The bounding of metaphor is an important theoretical issue, relating to the coherence of the category of prosaic metaphor. Issues will be illuminated by examination of the specific decisions taken in the study, and will be further discussed in Chapter 6. Application of boundary conditions will produce a set of metaphors that will then be available for analysis as to type and content. For this, it is first necessary to establish features of metaphorically used language that can distinguish 'types' through gradedness.

3.4 Graded conditions

The review of the key literature on metaphor in Chapter 2 has produced several gradable dimensions of metaphor among various suggested defining conditions. Both Black and Kittay dwell on the importance of the distinctiveness of the domains of Topic and Vehicle (Black 1979; Kittay 1987), and the degree of incongruity this distinctiveness generates when Topic and Vehicle are brought together in a metaphor. In Ortony's work (Ortony 1975), the effect of familiarity of the Topic domain is highlighted, and to this can be added the familiarity of the Vehicle domain. The density of domains is discussed by Black under the label "richness" (Black 1979), which Kittay deals with as the internal systematicity of domains (1987). Examination of the work of Aristotle and writers who build on his ideas (e.g. Aitchison 1987) has drawn attention to the degree to which a metaphor can be rephrased without the use of metaphorical language.

Adding to these produces a set of graded conditions at theory-level which can be applied to linguistic metaphors as relative to the knowledge or perception of particular individuals, or as generalised across assumed norms of a discourse community. Graded

conditions do not need to be independent one of another, but they should be independently applicable. For example, cognitive demand will not be independent of familiarity, but it will be possible to categorise Vehicle terms as high in familiarity but low in cognitive demand, or high / low in both. Since graded conditions are partly determined by the research aims, they also do not need to be exhaustive or independent: they can be added to or altered as required.

G1 Degree of incongruity between Topic and Vehicle

This includes the continuum 'transparency / opacity' used in relation to idioms to refer to how clearly and specifically the Topic and Vehicle are related.

G2 Novelty / conventionality of Topic-Vehicle link

G2-1 Idiomaticity: the degree of conventionality of a particular Topic -Vehicle combination

G2-2 Vitality: novelty / conventionality of a particular choice of Vehicle, given the particular Topic domain

e.g. kick the bucket is idiomatic in the sense of 2-1, but other Vehicle terms are more commonly used for the domain of *death* in the sense of 2-2 *e.g. sleep*.

G3 Paraphraseability / inexpressibility: the degree of ease with which the meaning of the metaphor can be explained in non-metaphorical language

Paraphraseability can refer to actions of the researcher/theorist or of discourse participants. The importance of paraphraseability in metaphor processing in discourse context is not immediately obvious; ease of paraphrasing does not seem to have an obvious link with ease of comprehension or production, since an understanding of a metaphor might equally well be reached through non-verbal means, such as imaging, non-algorithmic thought (Penrose 1989), or internal speech (Vygotsky 1962). It is retained as a graded condition, since explicit explanation of metaphors may occur, or even be useful, in educational contexts, and, in that case, the paraphraseability of a metaphor might affect outcomes.

G4 Cognitive demand of Topic and Vehicle terms and domains

Cognitive demand is a multiple condition, emerging from the interaction of factors that would include the internal structure of the conceptual categories concerned, the linguistic form of the metaphor, the level of abstraction of the conceptual content of Topic and Vehicle, and the open-endedness of the link, also called the "richness" of the analogical mapping (Gentner 1982(a), 1983) or "resonance" (Black 1979). One of the aims of the research study is to further delineate this dimension as it applies in educational contexts.

G5 Familiarity of Vehicle domain to producer and/or receiver

G6 Familiarity of Topic domain to producer and/or receiver

Both of these may be empirically determined for specific individuals, but may well have to be estimated for particular groups being researched, such as, in my case, 10 year old children in a rural British school. When used in conjunction with other conditions, such as G2-1 Idiomaticity, we have a way of relating an individual's knowledge to conventional norms.

G7 Explicitness of metaphor: the receiver's conscious awareness of the producer's metaphorical intention

This again can be empirically determined, but might also need to be inferred from the level of explicit signalling of the presence of a metaphor.

G8 Connotative power of the Vehicle term

While this may be impossible to measure precisely, it is intended to capture the notion of culturally-shared associations linked to a lexical item: e.g. *galleon* has historical connotations that are more limited, more specific and richer than those of *ship*.

G9 Systematicity: the extent to which the same or linked metaphors are used in discourse, locally or globally.

G9-1 Local systematicity of metaphors within a particular discourse event: extended metaphors

G9-2 Discourse systematicity of metaphors

**G9-3 Global systematicity of metaphors across discourse events:
system metaphors**

This the graded condition of "systematicity" describes how one metaphor may link with others at various levels of discourse, and can describe repetition or variation in metaphor use both within and across discourse events. G 9-1 can deal with systematicity at the level of sequential organisation of talk or text. G 9-2 accounts for metaphors used several times or in several ways, but just within a single discourse event: e.g. a poem by Robert Burns includes *my love is an arbutus / that grows by the stream*, but this metaphor is not generally found beyond the discourse event of the poem. G 9-3 applies to widely used metaphors such as those referring to success or failure in love and found in a wide range of songs, films, and poetry e.g. *a broken heart; my heart is on fire*. Lakoff and Johnson's "conceptual metaphor" (1980: 4) would have a very high level of global systematicity.

Systematicity as used here, as a dimension of metaphor in discourse, is external to the metaphor, in contrast with 'systematicity' as used by Gentner (1989) which refers to the internal systematic nature of the semantic field of the Vehicle term.

Graded conditions: summary

Figure 3.3 summarises a preference rule system for describing metaphor through necessary, typical and graded conditions :

Figure 3.3 Necessary, typical and graded conditions for linguistic metaphor

NECESSARY, TYPICAL AND GRADED CONDITIONS FOR LINGUISTIC METAPHOR IN DISCOURSE	
Necessary conditions	
N1	The stretch of language contains reference to a Topic domain by a Vehicle term (or terms)
N2	There is potentially an incongruity between the domain of the Vehicle term and the Topic domain
N3	It is possible to find a coherent interpretation which makes sense of the incongruity in its discourse context, and which involves some transfer of meaning from the Vehicle domain.
Typical conditions	
T1	The Topic term is usually stated explicitly, or its referent is visible to both producer and receiver
T2	The form is not negative
T3	The Vehicle domain is familiar to both producer and receiver
T4	The producer intends the utterance to be interpreted metaphorically
T5	The high level of incongruity between Topic and Vehicle makes it likely that the receiver will interpret the stretch of language metaphorically
T6	Of syntactic form, <i>A is B</i> .
Graded conditions	
G1	The degree of incongruity between Topic and Vehicle
G2	Novelty / Conventionality of Topic-Vehicle link
	G2-1 Idiomaticity
	G2-2 Vitality
G3	Paraphraseability / inexpressibility
G4	Cognitive demand of Topic and Vehicle terms and domains
G5	Familiarity of Vehicle domain to producer and/or receiver
G6	Familiarity of Topic domain to producer and/or receiver
G7	Explicitness of metaphorical intention
G8	Connotative power of the Vehicle term
G9	Systematicity
	G9-1 Local systematicity
	G9-2 Discourse systematicity
	G9-3 Global systematicity

3.5 Adequacy of the graded conditions

An initial check for the descriptive adequacy of the graded conditions can be carried out at this stage by checking that clusters of graded conditions will work to describe various types of metaphor:

(Metaphorical) Idioms

are metaphors that are high in G2-1 (Idiomacity), but variable in other graded conditions.

Strong metaphors

These are metaphors that are highly likely to produce new ways of thinking and analogical reasoning. They should therefore be expected to have high degrees of

G1 Incongruity

G2-2 Vitality

G3 Inexpressibility

G8 Connotative power in Vehicle term

with low degrees of

G2-1 Idiomacity

and varying degrees of the other graded conditions.

Similes

This category is defined by its surface linguistic form i.e. the inclusion of *like* as in
my love is like a red, red rose

Beyond that, the linking of terms may or may not result in a conceptual incongruity and its resolution, which are necessary conditions for classification as metaphorical. The examples above satisfies these criteria, whereas a simple comparison *this apple juice is like cider* does not.

We can then have a sub-category of (potential) linguistic metaphors called *metaphorical similes* which require the added necessary condition:

N4 Topic and Vehicle terms are linked with the word "*like*" or equivalent term

but which fulfil the other necessary conditions, and to which typical and graded conditions can be applied.

Further checks on the descriptive adequacy of the set of graded conditions will be carried out in Chapter 6, after they have been used with the data. Adjustments can then be made to improve adequacy.

3.6 A grammatical framework for linguistic metaphor

3.6.1 Requirements of a formal analysis of metaphor

Before beginning to apply grammatical categories to metaphorical uses of language, it is necessary to ask what work such grammatical categories are required to do in analysing metaphor in discourse. The linguistic form of metaphor in discourse is the surface manifestation of underlying conceptual processes of metaphor; in analysis, the Vehicle term of a metaphor is identified through its incongruity with its surrounding discourse i.e. from consideration of the conceptual content of the term. The metaphorical language itself acts to bring together two conceptual contents or systems, two sets of incongruent information that must be reconciled. The analysis of metaphor is then, at root, concerned with a conceptual process that is instigated and realised through surface language forms, and so any grammatical framework that is applied to M-U metaphor needs to maintain links between form and meaning, or at least maintain the possibility of retrieving such links. The pure syntacticism of generative grammar will not fit the needs of such an analysis. Moreover, human conceptualisation processes are not static, not adequately represented by classical set-theoretic categories, but are dynamic and, to some degree, context-dependent, often producing prototype effects. Any grammatical framework that is brought into use in this study needs to accommodate these factors. As with other aspects of the theoretical framework constructed in this first part of the thesis, a grammatical analysis operates at an abstract theory-level, but should be essentially compatible with the conceptual-processing level. Given such a grammatical framework congruent to processing level concerns, theory-level questions could then be investigated: for example, the relation of linguistic form in metaphor to the obviousness of the incongruity between Topic and Vehicle, or to the accessibility of the conceptual domains of the Topic and Vehicle for discourse participants.

3.6.2 Grammatical categories

An interplay between syntax and semantics was evident in an earlier work on the grammar of metaphor, carried out by Brooke-Rose in 1959. In her study of metaphor in English poetry from Chaucer to Dylan Thomas, she uses traditional categories of description: nouns, verbs, adverbs, adjectives, prepositions and pronouns, but defines them both syntactically and semantically, commenting explicitly on the flexibility of her terminology:

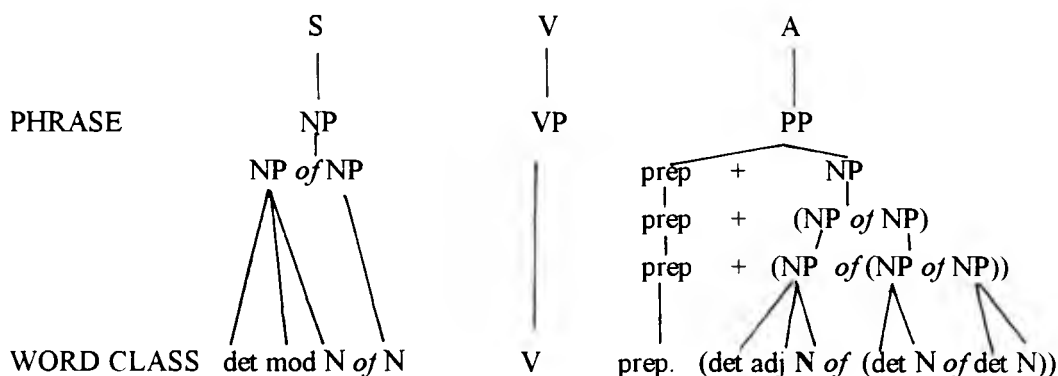
Sometimes I shall be using grammatical terms in a much broader sense than pure grammarians would allow, e.g. the demonstrative, for any method of pointing, or the genitive, for any kind of provenance. (Brooke-Rose 1958:17)

Similarly, in this applied linguistic study, use will be made of terms from different grammatical traditions, in a way perhaps not acceptable to 'pure' linguists, but in a way calculated to provide the most useful description of discourse data. Grammatical categories are kept as straightforward as possible, working from the Word Class of the Vehicle term to the syntax of the Vehicle in its immediate linguistic context.

The radially-constructed Word Class categories of cognitive grammar (Lakoff 1987) provide a basic level of grammatical analysis, with classes of Noun, Verb, Adjective, Adverb and Preposition. Phrase level constituents are then identifiable: i.e. a Noun Phrase is a group of words consisting of a Head Noun and Modifiers that can be replaced by a single Noun; a Verb Phrase consists of the lexical verb and any auxiliary verbs, and can be replaced by a single verb (Burton-Roberts 1986:33; Huddleston 1984). Phrases can nest inside each other and can combine syntagmatically to produce clauses, analysed in Quirk-grammar terms of Subject Verb Object Complement Adverbial (Quirk and Greenbaum 1975). The clause complex (Halliday 1985) rather than the sentence is taken as the upper unit since it is more useful for the analysis of spoken discourse.

A clause from the classroom data is analysed as an example:

CLAUSE [the local rocks of Cumbria] [fit] [into the overall picture of the age of the earth]



The Vehicle term *picture* is analysed as

- a noun
- within a Noun Phrase, pre-modified by the adjective *overall*
- within a larger NP, of the form NP *of* NP
- which forms part of a PP, acting as Adverbial of the Verb

The metaphor can be described grammatically in two ways:

1. The Vehicle can be described - as a noun.
2. The syntactic nature of the incongruous collocation can be described - between the noun *picture* and the rest of the Noun Phrase *the overall _____ of the age of the earth* (given that no concrete example of a picture was present in the discourse context).

More complex metaphors will require further levels of analysis, but this straightforward example shows two basic questions that a formal analysis addresses, and the more general research questions that lead on from them:

- What type of unit is the Vehicle term? -- how are different grammatical units used metaphorically?
- What type of (grammatical and discourse) structures is the Vehicle term found within? -- how are different types of syntactic structures used to convey meaning metaphorically?

3.6.3 Formal analysis of the linguistic context of metaphor

Having established, in broad terms, a set of grammatical units of analysis, we can proceed to establish a taxonomy of possible forms at the levels of words, phrases, clauses and clause complexes. This taxonomy is set up to serve the needs of the study, rather than to be exhaustive.

In the simple case of a 'typical' metaphor from written discourse, such as *a galleon moon*, both the Topic (*moon*) and the Vehicle (*galleon*) are explicitly stated, and the Noun Phrase containing Topic and Vehicle can be considered to be the metaphorical 'stretch of language', or, more briefly, the 'metaphor'. Discourse often presents less simple combinations of Topic and Vehicle terms and this section addresses the need to analyse the, as yet undefined, "stretch of language" that is the metaphor or metaphorical utterance. I take the conventional units, Focus and Frame (Black 1979; Kittay 1987), and adapt them for a discourse approach. This will be supplemented in the next chapter by a further interactional unit, the Metaphor Framing Episode (MFE), for the particular case of spoken discourse.

Black describes the Focus / Frame distinction as the *focus* being "the word or words used non-literally" set in a "surrounding literal *frame*" (1979:28). In the terms of this study so far, the Focus is equivalent to the Vehicle term(s), and the Frame relates to the Topic, although it does not necessarily coincide with it. It can then usefully account for cases where the Topic is not explicitly encoded. As the unit against which the incongruity is evident, the Frame, for Black, who was working with simple, constructed examples,

was the sentence. To work with texts longer than the sentence, Kittay suggests generalising the notion of Frame to “a complete metaphorical utterance”, a **minimal** unit of discourse against which the Focus appears incongruent, and notes that “metaphorical completeness need not be coincident with syntactic completeness” (Kittay 1987:65). However, for samples of real discourse rather than constructed short examples, this seems very difficult to operationalise in terms of both minimality and completeness: take for example the clause, *the atmosphere is the blanket of gases* that appears in one of the texts used in the second empirical investigation. The Vehicle / Focus term is clearly *a blanket*, and the lexical field of the Topic includes both *atmosphere* and *gases*. Identification of the Frame, however, is not straightforward, with several apparent possibilities:

- the whole clause *the atmosphere is (the blanket) of gases*
- the **beginning** of the clause *the atmosphere is (the blanket)*
- the noun phrase *(the blanket) of gases*.

Neither simple **minimality** or completeness will suffice to identify just one Frame; in addition, if our concern is with the processing of information at discourse level, then the syntactic structure of both the phrase and the whole clause would seem to be important since the information available to a receiver derives not just from the independent lexical items but also from the particular way in which they are collocated, the “local contexts of other utterances”, which go to make up “the emerging context” of the discourse (Schiffrin 1994: 416).

Rather than jettisoning the notion of Frame because of its undefinability, it will be maintained, but is to be seen in a discourse approach, not as a single stretch of language, but rather as a series of nested Frames, that work outwards from the Focus across the discourse. There may thus be an immediate, syntactically **minimal**, Frame, consisting of the clause or phrase element at the next level, of which the Vehicle is a constituent element. In the example of *the atmosphere is the blanket of gases*, the immediate linguistic Frame would be *(the blanket) of gases*, determined as the Noun Phrase of which the Focus / Vehicle is an immediate constituent. Beyond that, there may be further Frames at clause level, at sentence or utterance level, at the level of section of a text or a turn or exchange in spoken English, and at the level of discourse event. Such a set of nested Linguistic Frames may eventually encompass the whole of the discourse, and can be seen as linked to underlying Conceptual Frames which encapsulate the world knowledge brought to processing of the discourse by participants.

In some instances, there may be no Linguistic Frame within a turn that contains Topic terms: for example, when one discourse participant uses a proverb such as *a stitch in time saves nine* as a complete turn to comment on some shared situation. In such cases, a “default” frame (Kittay 1987; Steen 1989) is said to apply, in the sense of shared, but unspoken, understanding of the Topic of the metaphor. Default frames are brought into play in discourse processing as and when needed, with discourse context serving to disambiguate. Out of their discourse context, some metaphorical adjective-noun pairs are ambiguous as regards Topic and Vehicle. The example *dancing dinghies* clearly has an incongruity between adjective and noun, and in the context given, of small boats on the sea, it is clear that the noun is the Topic and the adjective is used metaphorically and is a Vehicle term. It is possible though to imagine a context, say a toddlers’ dancing class, in which this would be reversed, and the noun would be the Vehicle term. If such a phrase is encountered out of context, then a receiver will construct a default context in which it will make sense.

- ♦ The Vehicle and the Linguistic Frame then form the basic units of metaphor to which grammatical analysis can be applied. Grammatical analysis should be able to reveal the grammatical nature of the Vehicle term, and the syntactic ways in which the Vehicle is tied into the set of nested Frames that make up a particular discourse event.

3.6.4 The internal nature of the Vehicle term

In this section, the internal structure of the Vehicle terms of metaphors is described, and two distinctions worth making are found: one regarding the level of the Vehicle element, and the other regarding the formal nature of Word or Phrase that constitutes that unit. All examples of metaphors in the following sections are taken from the author’s data, unless otherwise attributed.

The lowest level unit able to act as a Vehicle term of a metaphor appears to be a free morpheme that forms part of a compound word e.g. *brain-drain* (Steen 1989) or *slowcoach*. Over time, English orthography sometimes joins together words that were originally separate parts of an idiom or formula, often with a hyphenated stage: *head-teacher* / *headteacher*. In other cases, all three orthographic possibilities co-exist: e.g. *tape worm* / *tape-worm* / *tapeworm*. Other compounds go straight to the one-word stage e.g. *slowcoach*; *greenhouse*. Some of these compound words may be categorisable as internally metaphorical, when the two free morphemes potentially belong to distinct semantic fields which are linked metaphorically e.g. *hothead* ; *brain-drain*; *spaceship*.

The next size unit is the single word Vehicle:

she whipped it off you

a blanket of gases

stick to your guns

If the Vehicle term is a single word then it can be allocated to a Word Class.

Beyond the single word Vehicle term, various types of multi-word units, phrases, clauses and sentences, can act as Vehicle:

you have to stick to your guns

it's driving me insane

how far on are you?

you've had an awfully good innings

the fireworks that go off when you smile (pop song)

Many of these multi-word units may be formulaic, processed as units and not particularly amenable to syntactic analysis, reinforcing the notion that the level of Vehicle element is worthy of attention in analysis.

At this point, the phenomenon of layering, of one metaphor placed inside another, appears. The example *stick to your guns* is an idiomatic metaphor that was used to encourage a pupil to hold on to her own point of view and not change her drawing in line with the teacher's suggestion if she didn't agree with it. It is thus, as a unit, used metaphorically. However, within the unit, there is the word *stick* which can be seen as a Vehicle term relative to the Topic of *guns*; a Topic and Vehicle lie within a Vehicle, a metaphor within a metaphor. A similar phenomenon can be observed in the example *it's driving me insane* where the Verb Phrase that is the Vehicle of the first metaphor can be further analysed as containing the Vehicle *driving* referring to the Topic process of becoming *insane*. To include this layering of metaphor within the formal descriptive framework, I need a further, possibly recursive, category that can contain these secondary Vehicle elements. This is labelled "Multi-word Internal", and may contain Multi-Word units that in turn contain Single Word or Word-Internal units. A key Multi-word Internal unit is the "Within Phrase" unit, since the phrase is the lowest level Vehicle unit that can itself contain a further metaphor Vehicle.

Multi-word Vehicle units will be, or will break down into, Clauses and then Phrases, with a noun, verb etc. as Head and thus as identifying feature:

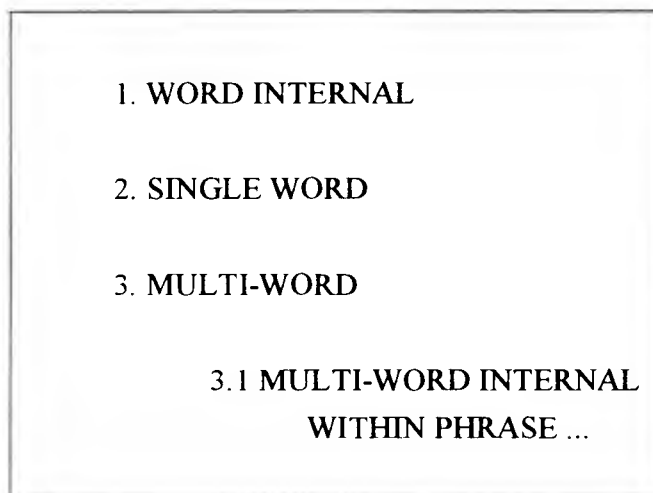
Mr C. will come up trumps

The Vehicle unit is a Verb Phrase, that can be further analysed as containing a Verb and Object Noun.

The largest multi-word Vehicle units will be what I shall call “metaphorical discourse units”, such as allegory or myth. It is to be expected that they would contain multiple layers of Vehicle terms.

The complete set of categories that describe the Vehicle or Focus unit by number of words is thus as follows:

Figure 3.4 Levels of Vehicle element



While not particularly complicated as a formal categorisation procedure, such a division of the Vehicle terms found in metaphors in discourse will enable an initial data analysis that may, for example, highlight formulaic or idiomatic metaphors in the multi-word category or creative metaphors in the single word category, but that, more importantly, facilitates further, methodical, grammatical analysis.

3.6.5 Cross level categorisation: nouns and verbs as metaphors

In this section, I examine some essential differences between Nouns and Verbs in conceptual and grammatical terms in order to argue that it will be useful to collect together Vehicle units across the size levels of Word and Phrase, as being “Nominal” or “Verb”, in order, for example, to compare use and frequency, and in order to determine appropriate identification procedures for non-nominal metaphors. Delexical verbs and prepositions in particular present examples of metaphor that raise issues about the boundaries of the category of metaphor. The differences of form, in addition to requiring

different identification procedures, may also affect real-time processing and discourse outcomes.

Nouns and Verbs are basic to language, in that they can be seen as relating to fundamental ways of being human (Hopper and Thompson 1984; Gentner 1978; 1982(b)). Sapir (1921) held that every language expresses a distinction between what is being talked about, the subject of the discourse, and what is said about the subject, the former usually being a person or object and the latter an action or the outcome of an action. This, Hopper and Thompson describe as “the universal lexicalisation of the prototypical discourse functions” (1984:703). Hopper and Thompson report Brown’s findings in first language acquisition research (Brown 1958) that early vocabulary contains labels for concrete objects which become Nouns, and for specific actions which become Verbs. Cross-linguistic contrasts between Nouns and Verbs as classes in early language acquisition are apparent; nouns, functioning referentially, are acquired early and rapidly, and are fixed cross-linguistically, whereas Verbs, expressing not reference but “relationships among entities” (Gentner 1978:988), seem to encode slightly different conceptual relationships across languages (Gentner 1982(b)). Learning verbs seems to present a more demanding task for a child than the learning of nouns, since it involves learning “how their language combines and lexicalises the elements of the perceptual field” (Gentner 1982(b): 325). Early vocabulary acquisition reveals a small number of key verbs that are each used in a range of communicative contexts.

The two radial categories of Noun and Verb are most clearly distinct when compared across their central members; prototypical elements of the Word Class “Noun” will be maximally distinct from prototypical members of Word Class “Verb”. Although each lexicalises a basic discourse function, there is a clear and, for this study, important, difference in status. Hopper and Thompson (1984) suggest that, in English, movement between the two classes is uni-directional, in that events are often nominalised, through affixes such as *-al*, *-ion*, *-ing*, *-ment*, whereas the reverse process of “verbalisation” is essentially different, in, not so much naming an event that becomes an entity, but rather naming an event that has links with an entity. Examples of verbalisation would include *he burrowed through the crowd* (Hopper and Thompson 1984) ; *the computer calendarises the data*; *they are being short-cutted* (author’s data). The creation of new verbs, through the process of verbalisation of nouns, may be less frequent than nominalisation because verbs are constantly being used more flexibly and with a wide range of possible collocated nouns. This flexibility of Verbs, and its implication for the use of verbs as Vehicle terms in metaphors, was noted by Brooke -Rose:

verbs are a more flexible element of language as far as meaning is concerned: that is, since they change their meaning slightly according to the noun with which they are used, they can also quickly extend their meaning and seem natural with each noun, so that an originally metaphorical use may fairly rapidly cease to be metaphoric if the verb is used in too many different senses with different nouns.
(Brooke-Rose 1958:209)

Matic and Wales (1982), in an experiment on the interpretation of novel metaphors, report that, in explicating the possible meanings of noun-verb anomalous pairs, such as *truck swung*, subjects were more likely to extend verb meanings than the meanings of nouns. Extension of verb use is seen too in early language acquisition, where a small number of verbs is used to express a large number of messages (Gentner 1978). This phenomenon continues in adult language use, with verbs used in slightly different senses with different collocated nouns as Subject or Object e.g. *throw a ball / a shawl over one's shoulders / a tantrum / a party*, and reaches its limits in the combination of frequency of use and delexicalisation in certain verbs such as *make, do, have, put, take*, as demonstrated by corpus studies (e.g. Sinclair 1991).

While *throwing a ball* and *throwing a shawl over one's shoulders* involve a different movement of hands and arms, and a different way of holding the Object, the two movements are similar enough for the same verb to function successfully to express both. In the case of *throwing a tantrum* the Object is non-concrete and no movement at all is involved, so that the use of the verb could be justifiably labelled metaphorical. The justification for metaphoricity of verb Vehicles lies not just in attributes of features of the movement or action, but also in the contrast between normal collocated nouns and the collocated noun in the metaphor; unlike nominal metaphors, metaphoricity is decided, in part at least, by moving beyond the potential Vehicle term to consideration of its collocates relative to usual collocates. This process, albeit sometimes at a higher level of abstraction, is what Lakoff and Johnson (1980), and others following their terminology, do when they reduce metaphors of all grammatical forms to the copular form *A is B* e.g. ARGUMENT IS WAR, from examples such as *he fired questions at his opponent*. Any effect of grammatical form on information content and processing, and on identification procedure, is ironed out in this reduction.

In obviously metaphorical verb use e.g. *the ship ploughs the waves* (Brooke-Rose 1958) the usual collocates of *ploughs* are highly predictable, and highly distinct from *ship / waves*. The effect of using a verb metaphorically may spread across the collocated nouns, so that *ship* and *waves* are also understood slightly differently as a result of the use of

ploughs e.g. the ship is understood to be strong and effective at moving through the water, which itself is understood to be moving regularly rather than dramatically.

verb metaphors have a more subtle and more complex effect than noun metaphors in that changes to usual meanings are less salient and unobtrusive, and in that surrounding nouns are also altered by implication.

(Matic and Wales 1982:252, quoting Brooke-Rose)

Returning to the example of *throw*, we saw that used with *tantrum* it might be considered metaphorical, whereas, used with *ball / shawl*, it is non-metaphorical. There may however be a range of possible Object Noun Phrases that would fit into a continuum between these two examples, and at some point on this continuum disagreement over metaphoricality might emerge. Again, boundary conditions are required in work with verbs metaphors in discourse data.

The greater flexibility of verbs in general over nouns in general, and the way in which the range of verbs is continually extended in use, suggests that verbs may produce significantly different effects from nouns when used metaphorically in discourse, and that this effect is worth capturing through having available a grammatical categorisation across levels of size. Thus 'Verb metaphors' will refer to those with Vehicle terms that are single word verbs or multi-word verb phrases, while 'Nominal metaphors' may have as Vehicle terms, single morpheme or word nouns, or Noun Phrases.

3.6.6 The Vehicle within the Frame: the syntax of metaphor

The concern in this section is with the formal ways in which a Vehicle unit is collocated with terms relating to the Topic domain, i.e. the Linguistic Frame(s). An example may make clear the aims and possibilities of this level of analysis. In the following sentence from a contemporary novel ("Debatable Land" by Candia McWilliam 1994), two incongruous elements i.e. Vehicle units, can be identified:

Their house in Edinburgh was the grey of spurned beaches, made of concrete harled with small pebbles that appeared to have been picked from the noses of the hills.

At the level of analysis of the previous section, we can say that both Vehicles are multi-word units, the first a Noun Phrase consisting of adjective modifying a noun. The second is much more complicated; the verb *picked* seems to work in two ways at once, linked with *from the hills* while simultaneously exploiting the connotations of the collocation of *picked* and *noses*. It might be argued that *noses* is the key Vehicle term in this second metaphor, or that the whole Verb Phrase should be labelled as such. Whichever we settle

on, we can proceed to analyse how the Vehicle Units are tied into the Frame(s) of the surrounding discourse. Again, the first Vehicle is simpler: the Noun Phrase is part of the Nominal group *the grey of spurned beaches* that provides the **minimal** Linguistic Frame, and is then part of the Subject Complement of the clause. Similarly, if *noses* is the second Vehicle then the Noun Phrase is tied into the Nominal Group *the noses of the hills*, and then, through being part of the Prepositional Phrase, is linked to the verb *picked*.

The complexity of metaphorical language achieved by a skilled writer is a reminder that seeking an exhaustive grammatical taxonomy of ways in which Vehicle units are tied into the Linguistic Frames of their surrounding discourse would be unhelpful and probably impossible, since, as the above example demonstrates, the ideational content of terms, and the resulting interaction of connotations in particular collocations, is an integral factor in assigning grammatical categories. What this section aims to do therefore is to list and examine some of the syntactical possibilities that will prove helpful in data analysis or that raise important boundary decisions.

(1) Frames of Noun (Phrase) Vehicles

I first consider three possible Noun Phrase Frames in which the Vehicle is also a Noun Phrase (includes Nouns), before moving to the wider Frame of a clause:

(1-1) Vehicle noun within a compound noun

The first possibility of this type is the metaphorical compound words, already mentioned above:

firewater

braindrain

slowcoach

The Vehicle noun, if in the first slot, works as a modifier, marking out metaphorically a sub-category of the other noun, or serving to highlight certain features of the phenomenon labelled by the compound. In the second slot, the Vehicle noun refers beyond the compound to the Topic of the metaphor. There is some evidence that the metaphorical term is more commonly found in the first slot than in the second. For example, Matic and Wales (1982), in their experimental study on the role of form in extending meanings metaphorically, presented their subjects with random pairs of words, nouns and verbs, and asked them to interpret them. The noun-noun pairs they used, such as *market fault* or *truck mantle* resemble compound nouns. Their results showed that the first noun of a pair was extended more frequently than the second noun, and that concrete nouns were extended more frequently than abstract nouns.

Elbers (1988) collected examples of metaphoric compounds from Dutch children aged between 3;10 and 10;8. Of the 16 of her examples relevant to this discussion, 12 have the first item extended i.e. acting as Vehicle term, rather than the second, which relates to the Topic. The remaining 4 fall into 2 types:

oog-pitten (eye-pips = pupils) *kams-nagels* (combs-nails = teeth of comb)

where the first noun is possessive, inflected in the second case,
and

water-schaduw (reflection in pond) *achter-borstje* (behind breast = back)

where the compound seems to parallel a modifier-head structure.

(1-2) Vehicle noun pre-modified by Topic adjective

the eternal sleep (Brooke-Rose 1958)

Such close positioning of incongruous terms may serve to signal metaphoricity.

(1-3) Vehicle Noun (Phrase) as part of a Nominal Group

The term 'Nominal Group' is taken from Sinclair (1991) to describe examples such as the following

- | | | |
|----|---|----------------------------|
| 1. | <i>road to fitness</i> | (from child aged 10 years) |
| 2. | <i>slaves of darkness</i> | (reading book for Year 5) |
| 3. | <i>the knife of pain</i> | (Myers and Simms 1982) |
| 4. | <i>(camels are) the ferries of the desert</i> | (from child aged 8;4) |
| 5. | <i>(the atmosphere is) the blanket of gases</i> | (science book) |
| 6. | <i>the grey of spurned beaches</i> | (McWilliam 1994) |

where a preposition, usually *of*, but also *in / to*, links the Vehicle noun (phrase) with another noun phrase to express a wide range of meanings. In metaphorical nominal groups, the Vehicle term usually seems to occur in the first slot, with the Topic or Topic-related term in the second. Brooke-Rose labels this form the "Genitive Link", and found it to comprise the largest group among noun metaphors, with the possible meanings generated by "*of*" for the relations between the nouns being "extremely complex and often ambiguous" (1958:147). Myers and Simms (1982:181) call the form a "*preposition metaphor* ...the quickest and easiest kind of metaphor to construct". This type of metaphor structure occurs repeatedly in the data, and will be shown to be more highly noticeable than other types, more frequent and potentially more effective. For these reasons, its grammar is examined in some detail at this point.

Sinclair (1991:84-98) analyses the occurrence of *of* in the COBUILD corpus, and I briefly review his analysis, in order to disagree with his treatment of metaphorical

nominal groups. As a very frequently occurring word (over 2% of all words in the corpus), around 80% of occurrences examined by Sinclair are found within nominal groups with the function of introducing a second noun that is the most salient to the on-going discourse, and, he argues, should be taken as the head noun. Sinclair (1991) isolates the following uses in non-metaphorical nominal groups:

- delineate a measure *one quarter of the human race*
- focus on a part *the middle of a sheet*
- focus on a specialised part *the first week of the war*
- focus on a component, aspect or attribute *the sound of his feet*
- with supporting noun *various kinds of economic sanctions*
- with nouns expressing vagueness *this kind of problem*
- linking nominalizations in a propositional type of relationship *reflection of light*

These categories overlap with the more traditional descriptions of the (semantic) relation between the two noun phrases, encoded in *of*: apposition, partitive, possession, origin, composition (from Huddleston 1984:269-70).

In the case of metaphorical nominal groups, the first noun (phrase) is held to offer a metaphorical focus (in Sinclair's unrelated use of the term) or support, for the second, which is classed as the head word. At first sight, Sinclair's analysis appears to work; in examples 1-3 above, the Vehicle nouns in the first slot apply to categories of people or objects, and do highlight certain attributes of the second noun, which refers to an abstract concept. However, as Brooke-Rose pointed out, *of* in metaphorical nominal groups can also have a range of meanings, and it becomes clear on examination that metaphorical nominal groups are not merely a separate set of nominal groups in which the first NP offers a particular kind of support to the second NP, as proposed by Sinclair. Measures or parts, for example, can also be expressed metaphorically :

the steps of the Sun

the surgy murmurs of the lonely sea (Brooke-Rose 1958)

a touch of indefinable pathos (Sinclair 1991:96).

In fact, metaphorical examples can be found across all the groups identified by Sinclair:

Measures: *a bit of old England*

Focus on a part: *At the centre of this system* (= the circulatory system)

Focus on a component: *the ferries of the desert*

Support: *the power of speech*

Sinclair's head-dependency analysis also seems inadequate, and I suggest that an alternative analysis of nominal group metaphors as inherently double-headed is more congruent with the two-way interaction between the NPs required for interpretation of the metaphor.

(1-4) Vehicle as Noun Phrase within the clause as Frame

1. *your fingernails* *are like* *stained glass windows* (from 6 year old)
2. *this tower* *is* *my symbol* (from Brooke-Rose 1958)
3. *the atmosphere* *is* *the blanket of gases* (from science book)

Other verbs than the copula, and which require a complement, such as *become*, *make*, *seem*, *call*, can join the Topic and Vehicle Noun Phrases:

e.g. *the pain that leaves my memory a traumatic sponge* (sic: contemporary pop song)

The combination of copula with nominal group appears to present potential information processing advantages to producers and receivers of metaphor. The ambiguity of *of* is constrained by the inclusion of the Subject Noun Phrase; background knowledge of the relation between this NP and the second NP of the nominal group (*atmosphere* ~ *gases*) may help disambiguation. At the same time the Vehicle Noun Phrase provides further information about this relation.

Noun Phrase metaphors in many ways constitute the simplest group to deal with: very often the underlying conceptual domains are obviously and non-controversially incongruous. The grammatical form seems to lay out the content of the metaphor in a manner contrived to assist processing and to indicate metaphoricity. Such clarity of form, content and processing interactions is less obvious in other grammatical forms of metaphor.

(2) Frames of Adjective (Phrase) Vehicles

any wasted time

I'm feeling blue

The Linguistic Frame of an adjectival metaphor may be formed by the Noun Phrase in which the adjective functions as modifier, as in the first example. The adjective may, as in the second example, act as Complement in the clause, with the Topic as Noun Phrase in the Subject position; the clause is then the minimal syntactic frame.

(3) Frames of Prepositional (Phrase) Vehicles

1. *we're in the clouds* (=happy)
2. *(sit) as though you were on a drawing pin* (book on horses for 10/11 year olds)
3. *in a world of her own* (from "Sophie's Snail" by Dick King-Smith)

There are two different possibilities for the metaphorical nature of the preposition in these examples: in examples 1 and 2, the whole prepositional phrase is used metaphorically, being incongruous with the Topic domain, whereas in the third example the preposition may be additionally seen as being used metaphorically within the prepositional phrase, in the sense that *a world of her own* is an abstract concept of mind and, it might be argued, the basic sense of *in* relates to physical containment.

In making such a statement, I assume that prepositions must function metaphorically, if they do so at all, in different ways from nouns, adjectives and lexical verbs, since it is not obvious that they have underlying conceptual domains that can, through juxtaposition, give rise to the incongruity required of metaphor. This is further clarified in Section 3.8, below.

(4) Frames of Verb (Phrase) Vehicles

A Verb (Phrase) Vehicle can be tied into the Frame(s) of the on-going discourse as part of a larger VP or as part of a clause; in either case, the incongruity will be identifiable between the elements collocated and the verb. Such elements may be Adverbial:

Since I die daily (from Brooke-Rose 1958)

but are much more likely to be nominal:

with Topic term as Complement / Object

waste time; use your head

with Topic as Subject

time is marching on

gases can escape

with Topic terms in both Subject and Object slot

Government drops plans (Newspaper headline)

the ship ploughs the waves (Brooke-Rose 1958)

In more complex clauses and combinations of clauses, Topic terms will be found in various other slots.

The apparently straightforward picture given by the highly schematic verbs in the above examples is, however, somewhat misleading. The greater flexibility of verbs in general over nouns in general, and the way in which the range of verbs is continually extended in

use (as discussed in 3.6.5), suggest that verbs may produce different effects from nouns when used metaphorically, and that, along with prepositions, they need special attention in respect of identification procedures. I now proceed to elaborate more exact identification procedures for verb and prepositional metaphors, working from the notion of the need to establish category boundaries by explicit decision rather than from implicit native-speaker consensus about the existence of incongruity that has been acceptable with nominal metaphors.

3.7 Identification procedures for verb metaphors

As we have seen, all verbs are easily extended in use (Brooke-Rose 1958) but "delexicalised" verbs (Sinclair 1991:113) such as *make* / *put* / *have* / *do* reach the extreme point of having very little intrinsic meaning together with very many potential meanings, or at least, possible uses. The precise sense of such delexicalised verbs in use is determined in relation to the immediately collocated Noun Phrases, or the Subjects and/or Objects implied by the discourse context, and the notion of an independent first order meaning, inappropriate in the discourse context but needed to access a metaphorical interpretation (Kittay 1987), seems to have been almost completely lost. There are two ways forward: one would be to decline to classify any uses of these words as potentially metaphorical. This does not remove the problem but rather defers it, since it is then necessary to decide on exactly which verbs are to be included in the set of those precluded from the possibility of metaphorical use: if *have* as in *have a good time* is kept as literal, would *see* as in *I see what you mean* be literal? and then what about *push* as in *she pushed the deal through*? The alternative solution also involves an arbitrary decision, but in this case the decision is made as to which uses of any particular verb will count as first-order, primary or non-metaphorical, leaving the others as metaphorical. It is tempting at this point to invoke the concept of an intrinsic "central" meaning (McCarthy 1990:24) or "congruent forms" (Halliday 1985) that could act as first order meaning, and against which some level of incongruity between conventionally collocating NPs of the given verb and the NP in question could be established. But this in turn is an arbitrary, or perhaps at most motivated (Lakoff 1987), distinction, since "central" meanings are not those that are the most frequently used (Sinclair 1991) and may not be, etymologically, the oldest. I aim instead to be explicit about the choice of one set of meanings, out of the range of possible meanings of delexicalised verbs, which is classed as non-metaphorical, so that the others may be classed as metaphorical. For example, the verb *go* is used very frequently and with many collocates. If we take as essential to its non-metaphorical meaning, a sense of physical progress or movement, then collocated words or phrases

that do not fit with this sense, but in which some sense of progress is employed, e.g. *go mad*, may warrant the label linguistic metaphor.

In establishing metaphoricity in this way then, each delexicalised word first needs a statement of what is to be taken as primary, non-metaphorical use, along with criteria for deciding whether or not it is that sense that is being employed in an utterance. So, for example, we could propose that *go* + *some physically real destination* is primary and literal, whereas *go* + *non-existent destination* is counted as metaphor; *have* (core meaning of "possessing/experiencing") + *concrete object / event* is primary and literal, whereas *have* + *non-concrete object / event* is categorised as metaphor; *get to* + physical location is primary and literal whereas *get to* + other NP may be metaphorical

To see how this procedure works with actual data, I present in more detail the example of *have*. This was fourth most frequent verb form (after *is was do*) in one of the sets of classroom data. 20 occurrences of *have* and 14 of *had* were followed by Object Noun Phrases such as *singing practice / dinner*. Eliminating concrete nouns left the following:

- A) *a backlog (of flights)*
- B) *an awfully good innings*
- C) *Skiddaw (= the trip to Skiddaw)*
- D) *a go*
- E) *a look*
- F) *a think*
- G) *a read*
- H) *a few minutes*
- I) *half an hour on the computer*
- K) *fire*

B) and C) refer to events, with *Skiddaw* being used metonymically to refer to "a trip to Skiddaw". D) - G) with nouns derived from action verbs, can also be construed as events, as can H) and I) when their following prepositional phrases are considered too. A decision is then made to include *have* + events as non-metaphorical, leaving two possible contenders for identification as linguistic metaphors: *have a backlog* and *animals have fire*, this latter coming from a story read aloud. This second example points to the necessity, as a step in the metaphor identification process, of checking collocated Noun Phrases for other possible causes of incongruity, such as ellipsis or metonymy deriving from shared discourse knowledge. *fire* here refers metonymically to 'the power to create and use fire for light, heat etc.', although in another sample from the data *we*

had the bonfire referred to 'the event of lighting a bonfire, standing around it etc.' It is the analyst's decision at this point as to whether *have* + *abstract nouns for ideas, skills, powers etc.* should be classified as linguistic metaphor or not. If it is decided that the primary, non-metaphorical uses do not include abstract nouns for ideas, powers etc., then A) is classed as metaphorical, as would be similar phrases such as *have a good idea*; *have the power to cast spells*. The decisions made at each point could have been different, and different sets of metaphors would then be produced. For example, if *concrete objects ~ events* is seen as a metaphorical extension, then a conceptual metaphor has been created by the decision of the researcher.

The procedure then for identifying verb metaphors is as in Figure 3.5.

Figure 3.5 Identification procedures for verb metaphors

1. Identify the conventional collocating Subject or Object Noun Phrases of the verb. If the verb is so delexicalised as to make this identification process debatable, then make an explicit statement of the primary, non-metaphorical meaning, and resulting prototypical noun collocations, being assigned to the verb.
2. Identify a domain incongruity between the Noun Phrases collocated in this particular instance, and those identified in 1.
3. Check for possible errors or for interaction within constructed worlds, that provide other non-metaphorical sources of incongruity.

3.8 Identification procedure for preposition metaphors

To establish the existence of incongruity that identifies metaphor, we are forced, as with verb metaphors, to search for incongruity between the collocated Noun Phrases of the utterance under consideration and those 'normally' used; establishing whether or not a particular instance of a preposition can be classified as metaphorical, first requires the establishing of a primary, literal meaning, against which other uses can be contrasted. The literature on the metaphorical nature of prepositions e.g. Quirk and Greenbaum (1973:153) (*in*) and Lakoff (1987) (*over*) does this by taking spatial senses as primary, thus motivating secondary, non-spatial, senses as being labelled metaphorical. Once again, though, actual discourse may throw up uses of prepositions about which specific decisions need to be made: for example, the preposition *through* occurs 10 times in the classroom data. In the following list, the verbs all indicate movement, with a primary

meaning of *through* as moving internally from one position relative to a hollow or permeable object (the Complement NP of the PP) to another, final position. It can then be decided that indicators of metaphorical use will include a verb that does not refer to a physical process and/or an abstract or non-hollow entity as Complement NP of the PP, since these are from domains distinct from the domains involved in the primary meaning:

A) <i>the liquid..</i>	<i>goes</i>	<i>through</i>	<i>the tube</i>
B) <i>we</i>	<i>got</i>	<i>through</i>	<i>passport control</i>
C)	<i>turning</i>	<i>through</i>	<i>four right angles</i>
D)	<i>to walk</i>	<i>through</i>	<i>(a dance)</i>
E) <i>could I just</i>	<i>go</i>	<i>through</i>	<i>what you managed to do</i>
F)	<i>getting</i>	<i>through</i>	<i>this book</i>
G) <i>I'm half way</i>		<i>through</i>	<i>(writing about) day three</i>

Utterance A) is non-metaphorical, B) and C) would seem to fall just within the boundary of linguistic metaphor, since there is a sense of an enclosed space, although *passport control* / *right angles* are also abstract concepts. In D) the sense of a physical enclosed space is lost altogether, with *dance* used metonymically to refer to the stages or positions of the dance. E)- G), with (metaphorical) verbs referring to intellectual rather than physical processes, and with Complements of the preposition that are in no way hollow or permeable objects or solids, would be most clearly categorisable as linguistic metaphor.

Once again, such boundary decisions are of course open to disagreement, but they are at least explicit; explicitness, it is argued, must replace correctness or 'truth' as a goal for the analyst of discourse data.

3.9 Conclusion

This chapter has established identification procedures for finding linguistic metaphor in discourse data. It has also set up two types of descriptive framework: the first uses graded conditions to address the ideational content of the metaphors, while the second provides formal grammatical descriptors. A further set of descriptors, that operate at discourse level, will be needed, and these are set up in Chapter 4 as applicable to the specific data collected in the empirical part of the study.

The process of constructing the category of prosaic linguistic metaphor has generated further research issues that will be illuminated by the empirical investigations:

1. What do 'typical' metaphors in use look like? and how does this compare with 'typical' products of metaphor as device?
2. What boundary decisions need to be made in establishing prosaic linguistic metaphors in practice? What do these reveal about the coherence of the category? and about the relationship between poetic metaphor and prosaic metaphor?

The next part of the thesis moves from the theoretical to the empirical, and begins the investigation of children's experience of metaphor in educational discourse.

CHAPTER 4

EMPIRICAL INVESTIGATION 1 - METAPHOR IN CLASSROOM DISCOURSE: BACKGROUND AND METHOD

4.1 Introduction

The previous chapters have clarified theoretical aspects of the phenomenon under investigation - metaphor in use in interactional contexts of education - and have refined procedures that will identify the basic unit of analysis, linguistic metaphor in discourse. Chapter 3 has set up grammatical categories and graded conditions for the description of metaphor.

In this chapter, I make use of these analytic tools to begin my empirical investigation of metaphor in educational discourse. The first investigation examines metaphor in educational discourse from the point of view of a particular child's experience, by recording the talk she listens to or participates in, and collecting the texts she reads over several days in the classroom. Analysis of metaphor in this data should add to our understanding of the types of metaphor that children encounter, the contexts in which metaphor occurs, and the functions that metaphor serves in classroom discourse. This first empirical investigation also tests out the units and procedures of analysis, and help evaluate the boundaries to metaphor categories established at the theoretical level, thus further clarifying the nature of prosaic metaphor in discourse.

Language use in a primary classroom is complex and varied in mode, in style and register of the discourses, in participants and purposes. Participants in interactions vary in number and in the roles they are assigned or choose to play in different discourse contexts. The classroom in which the data was collected resembles many other primary classrooms in the way settings create discourse contexts: the children were seated in groups, although they only sometimes worked collaboratively and spent quite a lot of time on individual tasks that would give rise to occasional discussions with neighbours. The teacher spent a considerable proportion of time in one-to-one discussions with pupils about their work in Maths, reading and writing; but even these apparently straightforward interactions could also become input for other pupils, who could hear them and would suddenly 'tune in' for a few minutes, perhaps then discussing what they heard with other children standing nearby or sitting at their tables. A further apparently straightforward type of classroom interaction, the teacher addressing the whole class in more formal delivery of subject matter, had attached to it other separate but motivated

interactions, when pupils might pick up an unusual word or idea to ponder on or discuss, or when they seemed to be trying to make sense of something the teacher said that contradicted their own knowledge. In more informal teacher-class interaction the teacher would use questions and other prompts in shared problem solving activities. At certain times, the children were removed from the normal environment into the hall for "assembly" in which they would listen to a religious story and recite prayers. Here, interaction was reduced to a minimum. All these oral discourse contexts, including a maypole dancing practice, involved the use of metaphorical and idiomatic language of various types, with written texts opening up further discourse contexts in which metaphorical language was encountered and produced.

Analysis of the nature and function of metaphorical language in such contexts needs to take account of the complexity and dynamics of interaction. If we want to better understand the metaphor experience of children in classrooms, then we need to attempt to unravel this complexity in sensitive ways. As the report of the first investigation proceeds, the complexity and dynamic nature of metaphor in classroom discourse is revealed through analysis working at a range of levels with a range of analytic tools, in which quantitative analysis of frequency and density of metaphor is combined with qualitative analysis of function and content across the sequential organisation of talk.

This chapter begins with a review of the literature on classroom uses of metaphorical language, both in educational texts and in teacher talk. I then move to the empirical study, with description of the research aims and context, data collection and methods of analysis. Further, discourse-oriented, units of analysis are set up to enable investigation of metaphor in relation to discourse goals and the sequential organisation of interaction. The results of analysis are reported and discussed in the following chapter, and will then lead into a complementary, more detailed investigation of the processing of metaphor by children.

4.2 Review of the literature on metaphor in educational discourse

Analysis of metaphorical language in classroom discourse needs to deal with the interactional complexity described above; clearly, some degree of idealisation and simplification is inevitable, but the construction of an adequately complex framework remains a key task. When we turn for assistance in such construction to the literature on children's metaphor, we find an inordinate degree of simplification, where, in contrast to the rich interactional environment of the classroom sketched out above, many of the empirical studies deal with the understanding or production of isolated sentence level

metaphors. Their usefulness for the purposes of this study may thus be limited and the study in turn may usefully complexify analytic frameworks for use with children and classrooms. The literature reviewed in this chapter concerns what is known about classroom uses (by teachers and in texts) of metaphorical language.

4.2.1 Teachers' use of metaphor

A study by Pollio et al (1977) measures how many figures of speech per minute of talk are produced, and estimate that, over 12 hours of talk, 4 figures of speech per minute were produced on average. The category "figure of speech" may approximate to the broad category of metaphor used in this study, but another set of studies have measured the frequency of "idioms". Idioms, when defined as phrases whose meaning is not derivable from the meanings of the individual words, will form a subset of "figurative speech" and of "linguistic metaphors". Lazar et al. (1989) measured the proportion of idioms in a total number of utterances (5400) of teachers of Grades K-8 (i.e. 5-13 year olds), and found at least one idiom in 12% of utterances, with more in the upper grades. As some comparison with non-school talk, Strässler (1982) reports a figure from of 1 idiom per 1,150 words in spoken data, but his definition of idiom is very strict and omits many metaphors. Johnson and Malgady (1980) report briefly a study by Johnson (1975) which estimates that 5 metaphors occur in every 100 words of general talk. These figures clearly diverge enormously.

The complex nature of the classroom data suggests that the units used by these few empirical studies should be retained as possibilities, with close analysis of the classroom data being used to generate more precise and appropriate units and categories to measure "metaphor density". Several different measures will be needed to provide a fuller composite description.

4.2.2 Frequency of metaphorical language in classroom texts

Written language, being linear, planned and permanent, would seem to present a simpler empirical database with potentially fewer problems of measurement. Even so, there seem to be only a few relevant studies: Pickens, Pollio and Pollio (1985:483) report a proportion of figurative language uses in basic readers of 1%, less in content area texts (Arter 1976; Dixon, Ortony and Pearson 1980) and 2.5% in recognised literature, excluding poetry (Smith, Pollio and Pitts 1982). This suggests that the language of early 'readers' i.e. books designed for the teaching of initial literacy, may differ quite strongly from other types of texts in having less metaphorical language.

Hollingsed (1950), reported by Abkarian et al. (1990), calculated that 100-300 idiomatic expressions occurred per book in elementary readers, although, without further information on the average length of a book, this data would seem to be of little use. Nippold (1991) examined books from three reading schemes aimed at 8-13 year olds and found that 6.7% of sentences contained an idiom. Evans and Gamble (1988) report Ortony (1979) as citing a frequency of occurrence of figurative language of 10 instances per 1000 words in school textbooks for 10 and 11 year olds. At an estimated 8 words per sentence this gives a figure of 8% of sentences containing an idiom, to compare with Nippold's figure, or alternatively Nippold's figure converts to 8.4 per 1000 words. On this limited evidence, the number of idioms in readers is low, and lower than in other texts, but increases across the primary years. Text books for curriculum content areas appear to have even fewer instances of metaphor.

The results of studies of both talk and text are combined in Table 4.1, below, with results of the studies made as compatible as possible. If figurative language includes, and approximates to, metaphor, and if idioms are often metaphorical while at the same time metaphors are not always idiomatic, this table merely gives an indication that figure around 10 metaphors per 1000 might be expected in classroom texts. The figure from Strässler for talk looks excessively out of line; we might expect fewer idioms in talk than in text, but probably not 10 times fewer. Likewise, the factor of 5 difference between classroom and non-classroom discourse seems unrealistically large.

Table 4.1 Comparison of figures for metaphor density from published studies

<i>Study</i>	<i>Discourse Context</i>	<i>Category counted</i>	<i>No. per 1000 words</i>
Strässler (1982)	non-school talk	idioms	0.87
Johnson (1975), reported in Johnson and Malgady (1980)	"ordinary discourse"	metaphors	50
Arter (1976, reported in Pickens, Pollio and Pollio 1985)	basic readers	figurative language	10
Smith, Pollio and Pitts (1982)	recognised literature (<i>sic</i>), excluding poetry	figurative language	25
Nippold (1991)	reading scheme books	idioms	8.4
Ortony (1979, reported by Evans and Gamble 1988)	school textbooks	figurative language	10

The published literature relating to teachers' use of metaphorical language does not then shed much light on the frequency or nature of metaphor in use. In order to extract a picture of previous estimates of the "metaphor density" of classroom talk, I am forced to work with studies that only approximate to the area of this thesis, in that they work with "figures of speech" or "idioms". Often the published reports of such studies fail to define or describe these categories satisfactorily, and / or make use of units of measurement that provide further difficulties in establishing any norms, varying from time in minutes to utterances to words. These limitations highlight how researchers' problematic decisions about what is categorised as metaphorical, and choices of units of analysis can have important knock-on effects as to what is found in the data.

4.2.3 Grammatical forms of metaphor in texts for children

A more detailed and more directly relevant study was carried out by Broderick (1992), examining the figurative language in 53 (US) children's story books for primary school age. He first identified linguistic comparisons of various grammatical types, which were then classified as being either figurative, literal or intermediate comparison. His frequency counts suggest that there are prototypical, or canonical, grammatical forms for each type of similarity, and that these diverge from the types of metaphors commonly presented to children in research studies. In fact, the most common forms used in the experimental studies he reviewed, nominal metaphors (NP *is* NP) and metaphorical renamings, appear to be among the least frequent forms in children's books. He is concerned about the implications of this apparent mismatch between test items and familiar forms, while making the point too that further research is needed to assess the metaphorical language children encounter in other ways, for example in conversation. Broderick's sources are to some extent culture bound; many favourite writers of books for English children, such as Janet and Allan Ahlberg, John Burningham, or Roald Dahl, do not appear, and some of those mentioned are relatively unknown in the UK. This may have an effect on the canonicity results, and would form an interesting follow-up study. In addition, the categories of comparisons sampled in the study are at sentence level or lower, so that the graded systematicity of metaphors (Chapter 3, Section 3.4) cannot be investigated.

4.2.4 Summary of literature review on metaphor in educational discourse

Very little useful information on the frequency of metaphor use has been found. Only one study has been found that examines the type of metaphors used in written story books, and none in classroom talk.

The limited literature gives a picture of frequent and increasing use of idiom and figurative language use in children's texts, with some evidence of variation across discourse and text types. The first empirical investigation should provide useful additional and more precise information about the frequency and nature of metaphorical language in educational discourse. The second investigation, which explores children's processing and interpretation of metaphors in text, will help evaluate whether the metaphorical language used in children's books, as reported here, is appropriately tuned to children's potential for understanding and using metaphor in both frequency and form.

4.3 Investigation 1 - Metaphor in classroom discourse: Aims

The review of existing research on the frequency of occurrence of metaphor demonstrates that, although some figures for the "metaphor density" of teacher talk and of texts used by children have been calculated, this notion does not seem to have been investigated across different types of discourse event and text, or to have been subdivided for different types of metaphorical language. Furthermore, little attention has been paid to the functions of metaphorical language, or to the matching of function and children's potential comprehension.

In this investigation, data was collected over a number of days in a primary classroom and analysed to try to answer the following broad question:

What is the nature of children's experience of metaphorical language in different classroom discourse contexts?

This is broken down into more specific research questions:

1. What is the frequency of occurrence of metaphorical language in different educational discourse events?
2. What types of metaphorical language do children encounter in classroom discourse?
 - level of metaphor units
 - grammatical form
 - lexical and ideational content
3. How is metaphorical language used in on-going classroom interaction?
 - in relation to other Topic- Vehicle combinations
 - in relation to non-metaphorical language

in relation to teaching goals

4. What ideational, interpersonal and interactional impact does the metaphorical use of language have in classroom discourse contexts?

Answering these questions should also shed light on the theoretical questions about typicality in M-U metaphors and the nature of prosaic metaphor posed at the end of Chapter 3.

4.4 Research context

The data collected for both investigations reported in this thesis are linked by their central focus on a 10 year old girl, here called Louise. She collects this set of data herself, through wearing a microphone connected to a personal cassette recorder that picked up talk addressed to her and around her; she is also in each of the groups from which the data for the second investigation was generated. Louise as focal subject is thus recorded across the data sets using language on her own, with one other, in a small group of peers, with teachers, and a range of types of language is involved in the data, including explicit talk about metaphor. The decision was made to focus on Louise in order to generate information about metaphor in a child's language experience across a range of discourse contexts, and to allow for reflection by the child, as the researcher built up a relationship with her and worked to develop her understanding of metaphor.

By focusing on one child in collecting the language of the classroom, I aimed to obtain a representative picture of a child's language experience that could then be investigated for metaphor in various ways. Other researchers have investigated separate aspects of classroom language: for example, Edwards and Mercer (1987) explored teacher/pupil talk, Maybin (1991, 1996) and Phillips (1985) free and directed peer group talk, Romaine (1984) investigated 'news-time', and Harris and Wilkinson (1986) analysed children's writing. As reported in Chapter 2, investigations into the production and comprehension of metaphor by older children have mostly been experimental studies (e.g. Levorato and Cacciari 1992, Wales and Coffey 1986), with naturalistic studies being restricted to younger children (e.g. Marjanovic-Shane 1989). For a 10 year old, the classroom is, for a large part of the day, their 'natural' environment, with peers and teachers as their fellow discourse participants. Maybin's earlier study also collected data from a 10 year old girl throughout the school day, and she points out the inadequacy of individualistic models of language use and development for describing the collaborative nature of much peer talk (Maybin 1991:36; 1994). She also draws on ethnography and

on the work of Bakhtin to describe the "richness and complexity of dialogues between children" (1991:48), but does not pursue a detailed linguistic micro-analysis. As I will explain shortly, I have tried to combine micro-analysis of language and content with macro-analysis of discourse context and interaction in order to pursue the role of metaphor in developing shared understanding and promoting learning.

4.5 The subject

Louise, aged 10;7 years at the beginning of the empirical investigation in late April 1992, was a pupil in her final year of primary education at a small, rural, Church of England primary school in North Yorkshire. Of the three classes, she was in the third, with 15 children from Years 5 and 6 (aged between 9 and 11 years); the class teacher was also the Headteacher, and the class had a regular part-time teacher on two mornings a week. The classroom was organised in four groups of children, sitting around tables. There was a mix of whole class teaching and group work, in which children in a group were working on the same curriculum subject e.g. Maths, but not necessarily collaboratively.

Louise was the oldest of two children in her (nuclear) family. She was selected by the class teacher as being "sensible" and likely to be communicative. She was a fluent reader, having completed the school's selected reading scheme, and could write competently, although not quickly. Cognitively, the teacher felt she was able, and perhaps poised for a period of rapid development. Louise's friend and classroom neighbour, Ellen, appears in many of the recordings, which reveal their private interactions as providing a background commentary and evaluation of what they heard, saw, read or wrote:

e.g. at the end of a TV programme

L (to E in whisper): *interesting wasn't it?*

Teacher to class: *interesting one?*

4.6 Data collection

Observations on metaphor in classroom uses of language in the preliminary visit to the school were described in Chapter 1. On the second visit to the school, the participation of Louise in the study was cleared with her parents, the recording equipment was tested out, and a discussion held between myself, Louise, Ellen and a third girl, Heather, to begin to get to know the children, and for them to begin to get used to being recorded. Some data collected on this visit will be included in the analysis.

The data from subsequent visits was collected by equipping Louise with a personal cassette recorder that she carried around or placed over the back of her chair.

Although this was not as discreet as might have been wished, it produced adequate recordings of her talk and talk to her from teachers and other children. While she quickly became less aware of the microphone, this was not the case for the part-time teacher who seemed very conscious of its presence. The class teacher who had carried out such data collection herself appears to ignore it successfully. However, as with any recording, the extent to which the apparatus ultimately affects the discourse is impossible to assess.

Recordings were made over four school days, yielding about 9 hours of usable data which was transcribed for analysis. There were also some informal conversations between Louise and myself to clarify points of information. Timed observation notes on the activities of the children and teacher were also kept by myself as researcher, sitting in on all lessons in a corner of the classroom. The written texts that Louise, read, wrote, or used over that time were noted, and were photocopied for analysis.

4.7 Data analysis: Categorisation of spoken data

The recordings were transcribed orthographically, and a sample can be found in Appendix 1. Full transcriptions are available from the author. Intonation was not transcribed, although some, obvious and relevant, use of stress is marked. Pauses were timed roughly on the first transcription. Extracts used for close analysis were re-checked against the recordings for accuracy in transcription and timing of pauses.

The classroom language data analysed here i.e. that which was principally teacher-led, consisted of distinct discourse events, labelled by the participants and bounded by changes of activity and/or location (Table 4.2) The talk varies in formality and setting, from on-going routine work in class to more formal, often pre-planned, input delivered to the whole class. The teacher orchestrating the discourse event also varied, with the class teacher (T1) being replaced for some lessons by a regular part-time teacher (T2), and the school assembly being taken by the teacher of another class (T3). While these variables could not be controlled for, the data was separately analysed to allow post-hoc investigation of possible differences in metaphor use.

Table 4.2 Discourse events recorded and transcribed as data for Investigation 1

Discourse Event	Type of activity	Teacher	Length of discourse event in minutes	No. of words in transcript
1. Class work (cw)				
1.1 Class work 1 (cw T1)	Children working on tasks that the teacher has set in advance. Teacher monitors, intervenes, or pursues a range of other goals un-related to the tasks such as correcting work, listening to reading.	T1	260	8723
1.2 Class work 2 (cw T2)		T2	12	636
2. Geology lesson (geol)	Input, and construction of shared understanding	T1	30	2578
3. Maths work				
3.1 With teacher T1 (maths T1)	Joint problem solving between teacher and class	T1	38	2203
3.2 With teacher T2 (maths T2)	Return of a maths test, with demonstration of correct answers. Maths problems given orally or in writing	T2	50	4547
4. Lesson on Apostrophes (apost.)	Input and practice exercises	T2	65	2831
5. Assembly (ass.)	Whole school gathered in school hall for address, hymns and notices.	T3	30	1672
6. Maypole Dancing (dance)	Teacher-led dancing practices in the school hall.	T1	70	3179
7. TV Programme (TV)	A schools programme and follow-up discussion, in the school hall.	T1	18	1916
Totals			573 minutes	28,285 words

From this point on, extracts from transcribed data are referenced with a 3 part label:

Event - Tape: line numbers

e.g. *Dance - Tape 4: 132-135* refers to the Dance lesson transcription, from Tape 4, lines 132-135.

The two instances of "Class Work" with the different teachers was initially analysed separately, but later combined in some counts. Initial analysis suggested that the second

data set was too small to be reliable, but that since metaphorical language was used in roughly the same proportions and with similar functions by the two teachers, combining it with the first data set would increase reliability of that set.

The data analysed is principally oral, although it includes anything originally written but read aloud or sung, such as texts from reading books, maths questions and hymns. It thus represents the classroom oral input and output of Louise over the period of the recording.

4.8 Data analysis: Levels of analysis of metaphorical language in discourse events

As suggested in the Introduction to this chapter, analysis of the nature and function of metaphorical language in educational contexts needs to take sensitive account of the complexity and dynamics of teacher-pupil interaction. To this end, units of analysis at various levels of discourse are employed: lexico-grammatical, content, interactional, contextual. Analysis is carried out internally within these units, and externally in the interaction of these units with units at other levels. In this section, I describe the units and levels of analysis before applying them to the data.

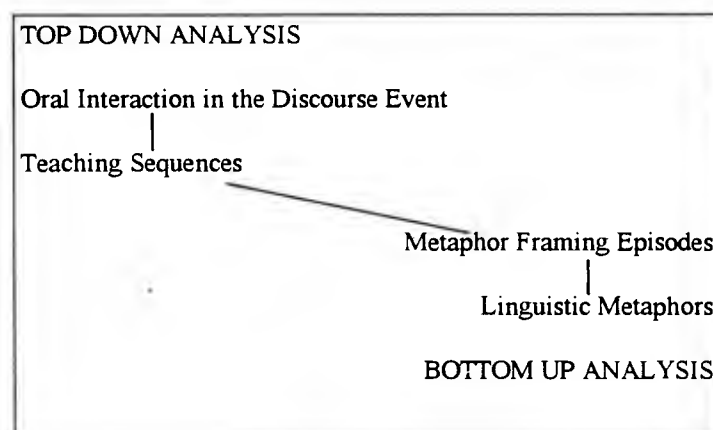
The context of each discourse event is described in terms of the participants and their roles, "participation structures" (van Lier 1988:167), the goals of participants, and the topic of the talk. In order to answer quantitatively the research questions on the metaphors encountered by children in these discourse contexts, the positioning and apparent function of each instance of linguistic metaphor was tracked and analysed. Analysis was two way and cross-level: working "top-down" from the discourse event macro-level to teaching sequences, and "bottom-up" from micro-level instances of linguistic metaphor to the immediate discourse frame of each instance, labelled "Metaphor Framing Episode". Analysis of the relation between Metaphor Framing Episodes and teaching sequences then allowed the teaching and learning function of linguistic metaphors to be analysed. Figure 4.1 shows a summary of the levels of analysis.

A range of quantitative and qualitative methods were applied to the data. The quantitative measures remained fairly straightforward, as the nature of the data did not justify complex statistical procedures, but were rather used in the belief that

simple counting techniques can offer a means to survey the whole corpus of data ... to gain a sense of the flavour of the data as a whole (Silverman 1993:163)

Qualitative methods drew on techniques of both Conversation Analysis and Discourse Analysis, in order to analyse how metaphor functions within the sequential organisation of classroom interaction and how patterns of metaphor use are built up across a discourse event.

Figure 4.1 Cross-level analysis of metaphor in classroom discourse



I now look at these units, and the internal and external analytic procedures applied to them, in more depth, beginning with the smallest unit of analysis, the linguistic metaphor.

4.9 Data analysis: Identification of linguistic metaphors

Following the criteria set out in Chapter 3, initial identification of metaphors was done on the basis of potential domain incongruency i.e. a linguistic metaphor was identified as a stretch of language in which a word or phrase appeared to have the potential to bring to mind a conceptual domain distinctively different from the domain of the immediate surrounding linguistic context. The Vehicle of the linguistic metaphor, seen as that stretch of language containing all incongruous terms, was extracted with sufficient of the immediate discourse acting as the immediate Linguistic Frame (Chapter 3, Section 3.6.3) against which incongruity was evidenced. Incongruities that could be seen as arising from errors or from shared understandings in particular discourse worlds (Chapter 3, Sections 3.3.3 and 3.3.4) were eliminated. Instances of the latter type included standard metaphorical ways of referring in school contexts e.g. in Maths *sixteen into two won't go* (maths T1 - Tape 7:9); in Literacy, *the apostrophe comes before the S* (apost - Tape 3:170). When non-standard metaphors appeared to be deliberately chosen or constructed for such purposes they were included.

Where there was possible doubt as to the metaphoricity of a stretch of language, the researcher's intuitions about the children's norms were drawn on. So for example, *what function is the apostrophe playing?* (apost - Tape 3: 7) was kept as a metaphor because of likely interpretations of *playing*. This type of decision affected only one or two linguistic metaphors. Other examples include *big numbers* (maths T1 - Tape 7: 96), *in its long form (word)* (apost - Tape 3:70) and the use of *say / tell* (e.g. cwT1 - Tape 3:666) for understanding written texts. Such uses of language, which for a Metaphor as Device approach would be only marginally metaphorical, may be important in developing children's understanding of intellectual processes. Their importance is discussed in more detail in Chapter 6.

Each repetition of metaphorical language, as a whole or in part, was counted separately since each potentially provides a further learning opportunity. The patterns and apparent functions of repetition are investigated in the qualitative analysis. In the quantitative analysis, the calculation of Type / Token Ratios for the metaphors gives some indication of the degree of repetition.

4.10 Data analysis: Boundary decisions for linguistic metaphor

Further decisions had to be made across the data from the discourse events about where to draw the line between metaphorical and non-metaphorical uses of some specific words and phrases (Chapter 3, Section 3.3.5) For example

point as in

at that point (referring to time) (dance - Tape 4: 138)
get to a point (referring to place) (dance - Tape 4:55)

way as in

do it that way (maths T1 - Tape 6: 144)
the long way to do it (maths T1 - Tape 7: 8)

As a principle, decisions to keep or jettison such potential metaphors were conservative i.e. avoided counting language that was highly delexicalised as metaphor, and consistent i.e. the same decision held for all data sets, unless use was importantly different, as when a systematic use of metaphor in planning talk in the Maths lesson with Teacher 1 included phrases such as

how might we arrive at a fairly accurate result? (maths T1 - Tape 6: 135)
you're on the right track (maths T1 - Tape 7 : 50)

This systematic use, within a discourse event, of a Vehicle domain related to travelling in particular directions appeared to justify retaining as linguistic metaphor phrases such as the above that included *way*.

Decisions about delexical verbs and prepositions were made in accordance with Chapter 3, Sections 3.7 and 3.8. A concordancer (Longman Mini Concordancer) was used on the corpus of data to trace all instances of particular words and check for metaphorical use. This was particularly valuable in checking all occurrences of delexical words such as *come*, *look/see*, *say/tell*.

The most difficult boundary decisions were related to lexical items like *think* or *find*, that are not particularly delexical but that have wide schematic use, some more clearly metaphorical than others. Decisions as to whether particular uses were to count as metaphorical were made relative to their use in their particular discourse context. Uses with important pedagogical implications are discussed further in Chapter 6.

4.11 Inter-rater reliability of the identification of linguistic metaphor

There were some safe-guards over intra-rater reliability of the metaphor identification procedures, in that the researcher checked the data at least three times, with considerable intervals of time between them, and then cross-checked any conflicts between the outcomes of the categorisation procedures. Lack of variation in the gross numbers of metaphors in the last two counts, despite some adjustment of individual items, was taken as some indication of intra-rater reliability.

The inter-rater reliability of the identification of linguistic metaphors was checked by asking another metaphor researcher, Dr G. Low of the University of York, to use the writer's criteria to identify linguistic metaphor in a chunk of the data. The inter-rater reliability check used the following procedure:

1. Explanation of the identification procedures and criteria for linguistic metaphor, using examples from the text data.
2. Researcher 2 identified linguistic metaphors in two pages of the Maths lesson with T1 data.
3. Comparison with Researcher 1; discussion and resolution of anomalies and disagreements.
4. Researcher 2 identified linguistic metaphors in the Geology lesson data
5. Discussion of disagreements

The linguistic metaphors identified by Researcher 2 fell into two groups: those that he was definite about; and those whose metaphoricity seemed to depend on specific boundary judgements as to literal / non-metaphorical meanings. At stage 4 in the above procedure:

8 metaphors identified by Researcher 1 were not identified by Researcher 2.

12 metaphors identified by Researcher 2 were not identified by Researcher 1.

18 of these 20 disagreements fell into the second group of those whose identification depended on arbitrary boundary judgements; for example,

scientists ..coming up with new ideas

minerals come out of rocks

(Geology - Tape 5 : 468; 198)

In reconsidering these boundary decisions, conservative judgements were preferred, unless the potential metaphors referred to intellectual or educational processes and events, in which case they were retained as potentially important pointers to the use of such language. 8 of the 12 identified by Researcher 2 were like the second example above, using verbs that suggest independent action by inanimate subjects. After further discussion, it was decided by the researcher to add this group to the set of linguistic metaphors. Only 1 of the other 4 was included as metaphor, after discussion of the criteria of domain incongruity.

Of the 8 metaphors identified initially and disagreed about, 1 was dropped, 6 were kept because they referred to educational or intellectual processes:

give you a little bit of information

(Geology - Tape 5: 196)

The final disagreement was over a pupil utterance:

is molten lava like wax?

(Geology - Tape 5: 376)

This was retained on the grounds of the existence of domain incongruity in the particular discourse context. The discussion however raised an important issue of the shifting from metaphor to non-metaphorical comparison across a stretch of discourse, which will be developed later.

At the end of the 5 stages, the actual number of linguistic metaphors identified in this stretch of data remained the same. The inter-rater reliability check could be said to have shown a high degree of reliability at this purely quantitative level, or alternatively a high degree of unreliability in initial identification. Much more importantly, by reinforcing or raising some important issues, it contributed to further clarity and explicitness in the identification decisions:

- as discussed in Chapters 1, 2 and 3, many of the boundary decisions involved in the identification of many linguistic metaphors are essentially arbitrary, at best motivated, and explicitness in respect of those decisions is required as an alternative to cut-and-dried boundary conditions
- metaphor can slip into what might be seen as non-metaphorical comparison over the course of several turns in interaction, suggesting that the role of metaphor may not be uniquely special and that other linguistic mechanisms are available for similar purposes
- verbs are more often questionable as to metaphoricity, especially delexical verbs used to suggest independent action of *inanimate* objects. Again, decisions need to be made, in this case motivated by the possible importance of such uses of language with children learning about the world.

It is believed that the increased clarity resulting from this inter-rater reliability process contributes to the replicability of the empirical study, and that as such, it was a worthwhile procedure. It remains important that any **claims** made for the results of the analysis are clearly delimited by the researcher. Although results are inevitably open to question because of the fuzzy nature of the categories, they may still, by being explicit in their limitations, add something to our understanding of metaphor use in classroom interaction.

4.12 Data analysis: Level, grammar, and lexical content of metaphor Vehicles

The initial identification of linguistic metaphors was followed by further categorisation in order to address the research questions quantitatively as well as qualitatively. They were first categorised as to the level of the Vehicle unit - word, phrase or clause - and then further analysed for their internal grammatical form (see Chapter 3, Section 3.6).

Level of Vehicle unit

As set out in Chapter 3, Section 3.6.4, Vehicle units of linguistic metaphor were classified as:

1. Word Internal
2. Single Word
3. Multi-word

3.1 Multi-word Internal

- Within Phrase

In most cases this categorisation was unproblematic. Where there was any doubt, a simple test of non-metaphorical paraphrase and substitution usually solved the problem:

I can read your lips (maths T2 - Tape 2:425)

was classified as word level after non-metaphorical paraphrasing required the substitution of *read* but not of other terms:

I can understand what you're saying by looking at your lips

The level and nature of the utterance as actually produced was taken as categorical of level, avoiding reconstituting instances of ellipsis, even though this meant that, as in the following exchange, several related metaphors were put into different categories:

e.g. <i>where does the time go?</i>	Clause level
<i>into the past</i>	Phrase level
<i>into the past</i>	Within Phrase level
<i>I know where the time goes</i>	Clause level
<i>time goes quickly into the past</i>	Phrase level

(Apostrophe Lesson - Tape 3)

Metaphors identified as "Within Phrase" required an incongruity to exist inside a Phrase level metaphor Vehicle. The incongruity was internal to the phrase, and may not have been incongruous relative to the on-going discourse:

make a mental note (apost.- Tape 3:3)

This was identified as a Phrase metaphor, and a further domain incongruity held to exist between *mental* as Topic and *note* as Vehicle.

crinoids wave their arms (Geology - Tape 5: 300)

This example, on the other hand, was held as containing two Word level metaphors *wave* and *arms*, but since there is no domain incongruity between these, no Within Phrase metaphor was identified.

Grammatical form

Categorisation was guided by the Word Class of the Vehicle term, or if a Phrase, of the Head word of the phrase, as described in Chapter 3, Section 6.

After initial grammatical analysis, it became clear that Verb Phrase metaphor Vehicles formed a large category that could usefully be further divided by separating off Phrasal / Prepositional Verbs such as

let's go back to these rocks (Geology - Tape 5: 351).

Both level and grammatical form analyses provided categories amenable to simple counting techniques and to some hypothesis testing, giving information as to the relative

frequencies and proportions of different categories of linguistic metaphor in each discourse event, and thus grounding the emerging picture of metaphor use in these basic features.

Lexical content of Vehicle terms

Since repetition of whole or parts of linguistic metaphors was a common occurrence, a further count was carried out of the different lexical types of metaphor Vehicle within each discourse event. This then allowed calculation of a Metaphor Lexical Type / Token Ratio which acts as some indication of the number of lexically different metaphors in each event.

"Type" was determined by lexeme / morpheme, so that *waste* in

*I'm not **wasting** my time* (cw T2 - Tape 3:46)

*to save any **wasted** time* (cw T2 - Tape 3: 2)

is counted as one type of metaphor in the particular discourse event.

4.13 Data analysis: Metaphor Framing Episodes

Moving up from the bottom-most level of analysis, in which linguistic metaphors were identified in their immediate syntactic frame, the next unit of analysis was devised to cater for the specific genre of classroom oral interaction (although this may well generalise to other types of oral interactive discourse). The repetition of particular Topic-Vehicle combinations, or very close reformulations of them, is clearly observable throughout the data, occurring usually within turns or across nearby turns. This may not be a particular feature of metaphor, but rather a general feature of oral interaction (Tannen 1989; McCarthy 1988). To cater for this linking of metaphors within the discourse, linguistic metaphors, i.e. the Vehicle term(s) and immediate Topic or Topic-related terms, together with their immediate surrounding discourse, were labelled "metaphor framing episode" in analogy with other published analyses of oral data (e.g. Kowal and Swain 1994, Samuda and Rounds 1993).

The Metaphor Framing Episode (MFE) is intended to serve as a discourse parallel to the semantic notion of Frame. The MFE is identified through clustering of features of

- topic (what is being talked about, which may or may not coincide with the Topic of the metaphor)
- speaker / addressee combinations
- sequential organisation

It groups together related metaphors that occur very close together or are sequentially linked. Thus, if a teacher addressed the whole class on a particular topic, and then directed a question on that topic to one member of the class, any metaphors used would be kept together. If, later in the same lesson, the teacher used metaphor in recalling the initial topic in talk with an individual pupil, the lack of sequential links would put this use into a separate MFE. An episode can only stretch across several turns if there is evidence of sequential organisation of the turns containing metaphor, as in one of the Maths lessons when a teacher's metaphorical question is answered metaphorically several minutes later by a pupil, forming an adjacency pair across the discourse.

Extract 1 presents an example of an MFE to help clarify the concept. In the extract, the teacher is talking with one pupil about something she has written. The particular interaction between this pupil and the teacher begins at line 151. Linguistic metaphors were identified in lines 151 (*started on you*) and 162 (*a knock-on effect*). The two metaphors were placed in the same MFE since

- 1) the combination of speaker and addressee is the same and
- 2) the topic being talked about (persecution and bullying) is the same.

NOTE: A list of symbols used in transcribing the data can be found on page 340.

Extract 1 Example of a Metaphor Framing Episode from the Class Work

K: what were you in?
 150 L: kent
 T: you can feel (.) persecuted (.) if (.) people **started on you** (.) at five to nine in the morning and nagged you (.) all day non stop (.) you would feel persecuted (2.0) so it's basically a feeling (.) but (.) would it affect you appearance (.)
 P: yes it would
 155 T: it would (.) wouldn't it? (.) because I reckon you'd be in tears by about (.) five past nine (.)
 P: yea
 T: so what you'd look like at half past three (.) goodness knows (1.0)
 P: so it's
 160 T: so (.) the effect (.) of the feeling (1.0) is to make you appear very miserable (.) you'd look very unhappy (2.0) basically (.) to feel persecuted (.) feel persecuted (.) and then it would have a **knock-on effect**
 P: right

(Tape 4)

The MFE can be seen as extending from lines 151 - 162, i.e. from the beginning of the utterance containing the first linguistic metaphor up to the end of the utterance containing the last metaphor. In the classroom context, a change of topic was often fairly

easy to identify because there was a move from one question, sum or example to another. Sometimes the change was between sub-topics e.g. from a general statement to a specific example. Topic changes can take place at turn boundaries, or within a turn, in which case they are often indicated by signalling features such as "decision markers" (van Lier 1988:177) e.g. "right", "now", often accompanied by significant pausing. Changes of addressee within the classroom context were quite often signalled with nominalisation. Field notes provided additional confirmation of addressee. Some episodes had less clear cut boundaries than those of Extract 1 where change of topic and addressee coincide. However, this element of fuzziness is not seen as a problem, since boundaries are not criterial in the types of analysis applied to episodes.

The MFE provides a basis for analysing how metaphors are related in classroom talk, and how they build on each other to create the pupils' experience with metaphorical language. Each metaphor framing episode was examined in quantitative terms for the number and type of metaphors within it. The number of episodes within events was counted. Qualitatively, analysis was carried out of the types of relations between metaphors in the same MFE, to investigate systematic content links (local systematicity) and how metaphorical language may be made more accessible to discourse participants, for example through reformulation or elaboration. Systematicity of metaphors across episodes was also analysed.

4.14 Data analysis: Teaching Sequences within discourse events

The top-down analysis of the data proceeded through the preliminary analysis of each discourse event into "teaching sequences" that reflected the teacher's goals, at the level of 'action' in Activity Theory terms as described by Donato (1994), Lantolf and Appel (1994).

"Teaching sequences", each with a distinct teaching focus, were identified through examination of language, goals and actions, either as explicitly stated by participants or implicitly signalled by the announcement of a change of activity. Both transcript data and field notes were used to do this. In the extract below, two sequence boundaries can be observed: the first at line 2 and the second at line 4. Each of them is marked by a long pause, a decision marker (*so; now*), and a change of activity to *looking at* and then to reading aloud.

Extract 2 Boundaries of Teaching Sequences

Geology Lesson

- 1 T1: it won't take very long cos it's very short (1.0)
- 2 so (.) looking at the first sheet first (2.0) if I let you read (.) that one right? (.) there
- 3 is a great variety (.) of rocks to be found (.) on the earth (2.0)
- 4 now (.) would you like to read on from there (.) Ellen (4.0) from (.) "a simple.."

Tape 5: 206 - 209)

A limited number of teacher foci were identified in the data, either through explicit labelling by teacher or pupils, or by reference to what actually happened in, or as a result of, a particular sequence. The set of teaching focus descriptors draws on relevant literature (van Lier 1988; Mercer 1995; Alexander 1997; Barnes and Todd 1995). None of these studies provided a set that could be used without adaptation, and the resulting set combines their categories with the categories generated by the data, attempting to maintain a balance between exhaustiveness and elegance. The key types of teaching sequences and sub-sequences identified in the data are shown in Table 4.3.

The use of language for procedural purposes or "framing" (van Lier 1988; Roberts et al 1992, drawing on the work of Bateson 1972 and Goffman 1974) is covered here by the two categories of "Organisational talk" and "Agenda Setting". These proved to be important sites of metaphor use, with the distinction between the two remaining clear; "organisational" reflects concern with the concrete (chairs, pencils etc), while "planning" is concerned with the abstract (ideas, concepts, tasks etc). Having these two as distinct also allowed the links between them to be analysed, so, for example, framing the conceptual process of the lesson might be reflected in the organisation of the chairs and tables.

The 'dustbin' category (6.) contains teacher talk not categorisable in 1-5 above. In line with the general aims of categorisation in of discourse data (Sinclair and Coulthard 1975) this was minimised, and contained mostly teacher asides and interruptions to the event by visitors to the classroom. Since the data was mostly teacher talk, the category of pupil talk (7.) was not further sub-divided in this analysis but dealt with separately.

Table 4.3 Teaching Sequences in classroom discourse events

<p>1. Instructional</p> <ul style="list-style-type: none">1.1 explanation of concept, action, skill etc1.2 exemplification1.3 modelling by demonstration, or verbally1.4 checking understanding1.5 recap
<p>2. Framing</p> <ul style="list-style-type: none">2.1 Organisational <i>giving instructions relating to the logistics of the classroom or lesson</i> "hardware" <i>e.g. worksheets, pencils</i>2.2 Agenda setting <i>negotiating with pupils the content or process of a lesson</i>
<p>3. Feedback</p> <ul style="list-style-type: none"><i>comments on or evaluation of pupils' work</i>
<p>4. Control</p> <ul style="list-style-type: none"><i>stopping or pre-empting unwanted behaviour</i>
<p>5. Information search</p> <ul style="list-style-type: none"><i>asking pupils for (genuinely unknown) information</i>
<p>6. Other</p> <ul style="list-style-type: none"><i>e.g. talk with visitors to the class</i>
<p>7. Pupil interaction</p> <ul style="list-style-type: none"><i>talk between pupils</i>

In some of the classroom discourse events, discourse structure was strongly constrained by the content and goals. For example, in the "Maths work with T2" in which the teacher returned a test the pupils had completed the previous week, characterised by participants as "going over a Maths test", the discourse moved predictably from one question on the test to the next. Furthermore, in going over each question, the teacher first gave some comments on the difficulty of the question and the success of the pupils in tackling it, then elaborated on how to answer the question, and wound up with further feedback on difficulty and/or success levels. The discourse event thus could be articulated easily into sequences that broke talk around each maths question into feedback, explanation and so on.

The impact of metaphor was analysed at the level of the sequence, within the discourse event. As set out in 1.5.4, three dimensions of "impact" were used: ideational, interpersonal and interactional. Each use of metaphor was examined for the nature of the impact it created on the discourse and on participants, with evidence coming from the talk or observable reactions recorded in field notes.

4.15 Cross-level analysis

After articulation of an event into teaching sequences and nested sub-sequences, the Metaphor Framing Episodes were mapped on to the discourse event, allowing the use of metaphorical language to be analysed from the perspective of the contribution made by metaphor to the teaching goals, and pedagogical patterns of use of metaphor to emerge. An example of the mapping of the Geology lesson can be found in Appendix 2. Although MFEs and Teaching Sequences are not entirely independent because they are linked through topic and addressee, they do map the discourse differently, with the MFE working upwards from the linguistic metaphors and the Teaching Sequence working downwards from the goals and process of the whole event. The interplay of the two analyses provides a fruitful range of insights into the use of metaphor in educational discourse that will be reported in the next chapter.

CHAPTER 5

EMPIRICAL INVESTIGATION 1 - METAPHOR IN CLASSROOM DISCOURSE: RESULTS.

5.1 Introduction

This chapter reports the results of the various analyses of recorded classroom data described in Chapter 4. The results will be presented in a way that tries to reveal gradually to the reader something of the nature of the dynamic complexity of metaphor in discourse, and its interaction with non-metaphorical language in constructing patterns of participation and engagement in educational discourse events.

Presentation of the results will be followed in the next chapter by a discussion of the implications for the theoretical frameworks of metaphor and for education. The discussion will lead into the second empirical investigation, of children's interpretations of metaphor.

The first results reported are quantitative results about the frequency of linguistic metaphors in different discourse events, their lexical content and their grammatical form. I then show how individual metaphors group together in Metaphor Framing Episodes, and how these episodes map on to the event structure analysed as teaching sequences. Having shown through this cross-level analysis how metaphors function ideationally and interpersonally in educational discourse, I then return to the level of the episode, where the links between metaphors and non-metaphorical language are shown to produce intricate patterns of interaction. Consideration of the lexical content of metaphors adds a further layer to the emerging picture of systematicity and risk management in metaphor use. I also report analysis of the small amount of data relating to how pupils respond to metaphors encountered in discourse.

As has been discussed at length in previous chapters, the identification of prosaic metaphor is unavoidably fraught with difficulties, and the researcher is forced to make continual decisions about what will or will not be counted as linguistic metaphor. Each decision affects the nature and size of the category of prosaic linguistic metaphor, and, very often, the more difficult decisions concern more frequent lexical items such as delexical verbs, with resulting greater knock-on effects. Restraint has been exercised therefore over the use and manipulation of quantitative data; only very broad calculations and comparisons are made, that give a feel for the nature of the data, and, when

presented as 'results', these are usually expressed non-numerically. Nonetheless, I would claim that important features of prosaic metaphor are suggested by the quantitative results which are presented in this chapter. Key results are signalled along the way with bullet points, and brought together in a summary at the end of the chapter.

5.2 Density of linguistic metaphor in classroom discourse

5.2.1 Frequency of metaphorical use of language in classroom discourse

Once the linguistic metaphors in each discourse event had been identified, checked and re-checked, they were first simply counted to give raw frequency figures for each discourse event. All repetitions of particular metaphors were included in this first count, and later taken account of through calculation of lexical type/token ratios for each discourse event.

- ◆ A total of 406 linguistic metaphors occur in the 28,285 words, giving a frequency of 1 metaphor per 70 words or 14 metaphors per 1000 words.

Of the 406 metaphors identified across the 9 discourse events, 28 were produced by the pupils i.e. about 7%. The analyses presented here were carried out on the combined production of metaphors. Breakdown of metaphor density by discourse event is shown in Table 5.1 below.

Table 5.1 Numbers of linguistic metaphors in each discourse event

Discourse event	Number of metaphors
Class Work with T1	87
Class Work with T2	7
Geology lesson	42
Maths with T1	35
Maths with T2	70
Apostrophe lesson	61
Assembly	44
Maypole Dancing	41
TV programme	19
TOTAL	406

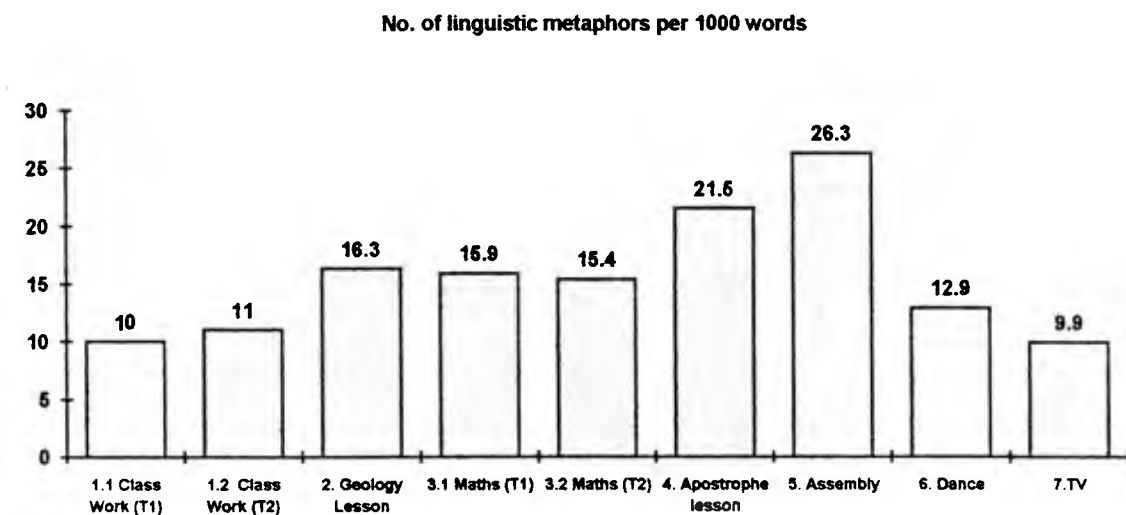
5.2.2 Density of metaphor in classroom discourse

The raw count of linguistic metaphors in the transcripts was converted into a measure of metaphor density by dividing the number of linguistic metaphors by the number of words in an event transcript and then multiplying by 1000, producing a result for "metaphor density" as the number of linguistic metaphors per 1000 words for each event. For

example, in the Maypole Dancing lesson 41 metaphors were found and 3179 words appear in the transcript. This gives a metaphor frequency of 12.9 metaphors per 1000 words.

Figure 5.1 shows the density of linguistic metaphor in each discourse event. Metaphor density varies from 9.9 metaphors per 1000 words in the TV programme to 26.3 per 1000 in the Assembly, i.e. the Range is 16.4, which is about 3 times the Standard Deviation of 5.5.

Figure 5.1 Metaphor density in discourse events



- ◆ The average metaphor density across the nine discourse events is 15.5 linguistic metaphors per 1000 words.

Comparing this average frequency with the few published studies summarised in Table 4.1, we can see that it falls somewhere between the figures reported for use of (written) figurative language in school textbooks and basic readers, and use in recognised literature. This suggests it is not unreasonable as a figure, although little more can reliably be said

5.2.3 Variation in metaphor density across discourse events

To test out the probability of these results for metaphor density showing significant variation across the nine events, a chi-squared "goodness of fit" test was carried out. This tested the results against a hypothesis of equal probability of occurrence across all events (Robson 1994(a) :106).

The results gave $\chi^2 = 16.63$, which is statistically significant at $p < 0.05$, for 8 degrees of freedom.

- ◆ There is therefore statistical evidence of a significant departure from equal density of metaphor in the different discourse events.

We can also note that the two samples of Class Work produced similar density results, as did the two Maths lessons, suggesting at this point that metaphor density may relate to the type of event rather than to individual style.

5.3 Semantic content of linguistic metaphors: an overview

Across the data, an examination of the types of Vehicle terms in linguistic metaphors grouped these in the following categories:

Words with high indexical valency: *go, come, find, think*

Schematic lexical items: *butter, lollipop, whip off, kingdom, miracle of spring*

Formulaic items: *stick to your guns, let it rip*

The general picture that emerges is of widespread use of Vehicle terms with high indexical valency (Widdowson 1983:94) and comparatively rare appearances of striking metaphorical idioms or carefully chosen schematic Vehicle terms. If we were to apply Black's criteria for metaphoricity of being "active" and "strong" (Black 1979: 26-27), no more than about 8 out of the 406 expression could be classified as metaphors worthy of further investigation. The most vital metaphors come from the focus pupil, Louise:

(someone) is going to be squashed meat with pepper and mustard all over

(cw T1- Tape 5:184)

and from teacher T1:

rock...becomes like sticky treacle ... or even like runny butter

(Geology - Tape 5: 374-376)

A strong personal factor seems to come into play in the use of idioms when semantic content is examined. Teacher T1 produces several striking, perhaps rather archaic, metaphorical idioms:

keep the kettle boiling

(cw T1-Tape 6: 190)

had a good innings

(cw T1-Tape 1: 792)

come up trumps

(Geol - Tape 5: 342)

and other less unusual ones:

<i>keep your fingers crossed</i>	(Dance - Tape 4: 29)
<i>on the right track</i>	(Maths1 - Tape 7: 50)

T2, on the other hand, seems to produce fewer and less striking idioms:

<i>ring a bell in your mind</i>	(Maths 2- Tape 2: 503)
<i>it was a mystery to me</i>	(Maths 2 - Tape 2: 453)
<i>that's only half the story</i>	(Maths 2 - Tape 2: 323)

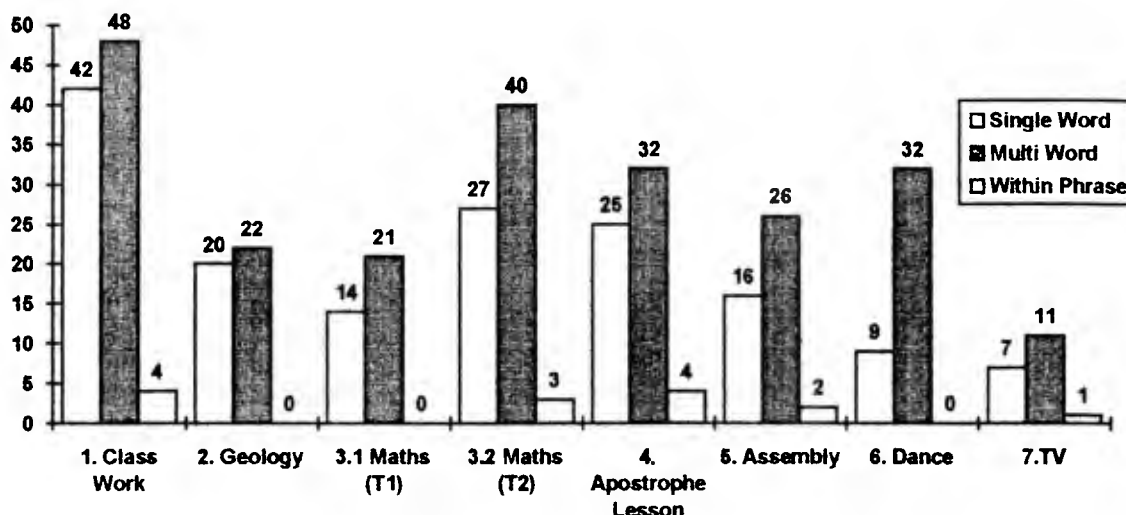
- ◆ Prosaic metaphor in classroom discourse often features Vehicle terms with high indexical valency; striking Vehicle terms are likely to be part of metaphorical idioms used formulaically, rather than deliberately chosen as part of active, vital metaphors.

5.4 Level of Vehicle unit in linguistic metaphors

In this section I report the results of analysing the stretches of language categorised as linguistic metaphor in terms of the level of the Vehicle units. As metaphors were extracted from the data, they were classified in terms of the Vehicle units, as Single Word metaphors e.g. *lollipop trees*, or as Multi-Word metaphors e.g. you have to *stick to your guns*. Multi Word metaphors were then examined for any internal metaphoricity, i.e. whether the Vehicle unit of the metaphor itself containing a further incongruous Topic and Vehicle e.g. *stick to your guns* where *stick* and *guns* are incongruous. These latter metaphors give some indication of layering of metaphors. The category of "Word-Internal" metaphors was dropped, since only one possible example was found (*bookworm*). This was put into the Single Word category. Multi Word Internal metaphors then included only Within Phrase metaphors, and from this point on, these categories are collapsed.

In a raw count, Multi Word metaphors were consistently more frequent (Figure 5.2 below), and the number of Within Phrase metaphors did not appear to depend on how many Multi Word metaphors actually occur. Within Phrase metaphors occurred largely in layered idiomatic metaphors such as *stick to your guns; does this ring any bells in your mind? ; make a little mental note.*

Figure 5.2 *Frequencies of Single word, Multi Word and Within Phrase Metaphor Vehicles in each discourse event*



The Maypole Dancing lesson appears as somewhat anomalous in featuring a small proportion of single word metaphors. Inspection of the dance lesson analysis shows that many of the metaphors used were idiomatic phrases used as commands e.g. *pick your feet up* (Tape 4: 29) or to describe the process required *we have to polish it up* (Tape 4: 183); *the secret to this skipping thing* (Tape 4: 100). The demands on the teacher in this lesson were very high; she was organising pupils and tape recorder, demonstrating the dances, watching and giving feedback. High processing demands perhaps contributed to a greater use of conventional idiomatic phrases that could be retrieved as formulae.

- ◆ Across the set of discourse events, there is a consistent pattern of more frequent use of Multi-Word Vehicle terms than of Single Word terms.
- ◆ In terms of typicality conditions, this suggests that a typical linguistic metaphor in classroom spoken discourse has a Vehicle term of two or more words.

I now move to report results of the grammatical analysis of linguistic metaphors, and find once again that, for prosaic metaphor, typicality is very different from the apparent assumptions of many metaphor theorists.

5.5 Grammatical analysis of linguistic metaphors

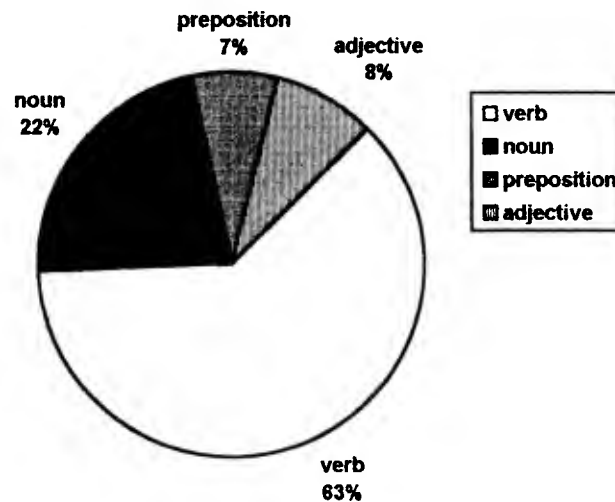
Grammatical analysis of the linguistic metaphors identified in the data focused on the form of the metaphor Vehicle (Chapter 3, Section 3.6.2). For Single Word metaphors, the Word Class of the Vehicle term, and its syntactic function in the clause of which it is

an element, were the key classifying features. Multi Word metaphors were classified as Noun / Verb / Adjective Phrase etc depending on the Head word.

5.5.1 Relative proportions of different grammatical forms

It was clear from the beginning of the data analysis that verb metaphors would vastly outnumber nominal metaphors at both Single Word and Phrase levels, even with fairly tight constraints on what was counted as a verb metaphor. The size of the difference can be clearly shown in graphical form (Figure 5.3 below), in which Single Word and Multi Word metaphors are put together. The very small number of adverb metaphors has been omitted.

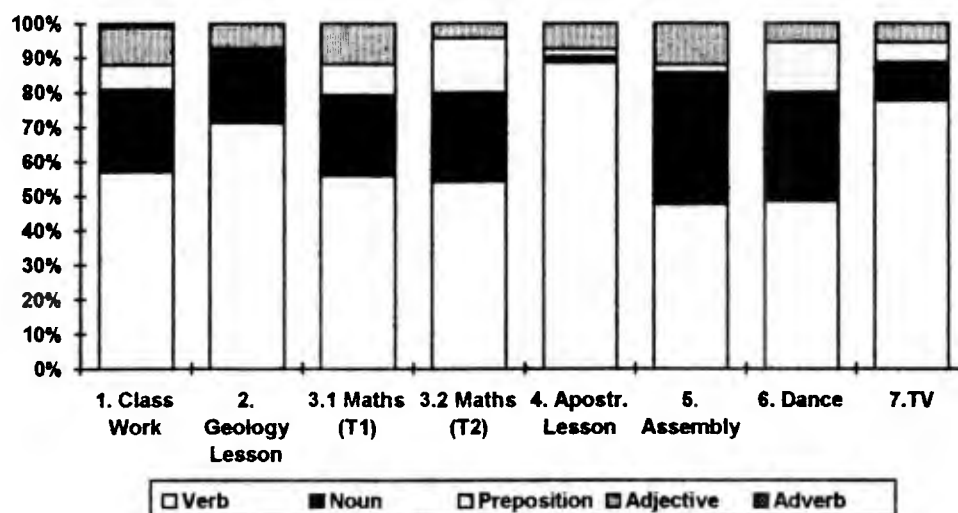
Figure 5.3 Proportions of different grammatical forms of metaphor Vehicles (%)



A table giving exact numbers of different grammatical forms of Vehicle terms in each discourse event can be found in Appendix 3.

The graph that follows (Figure 5.4) displays, for each discourse event, the proportions of Noun, Verb, Preposition, Adjective and Adverb metaphors. This graph illustrates the variation that occurred in the relative proportions of grammatical forms of Vehicles in different discourse events.

Figure 5.4 Grammatical forms of metaphor Vehicles in discourse events



- ◆ The overall distribution of grammatical forms shows that the general picture of a preponderance of verb metaphors is broken only by the Assembly, which features a relatively higher proportion of nominal metaphors.

The lesson on apostrophes has only one nominal metaphor, along with 47 verb metaphors. When we look at the nature of the metaphors, we find that even this one noun metaphor Vehicle is a somewhat marginal example of metaphoric catachresis :

the spine's almost broken (Apost- Tape 3: 266)

In this discourse event, the higher proportion of verb metaphors can be accounted for by observing that, in addition to the use of metaphors to talk about classroom processes as will be described below, the content of the apostrophe lesson also concerned actions and processes, in this case the use of the apostrophe to shorten words or show possession.

The Assembly has a higher proportion of nominal metaphors to verb metaphors (a ratio of 1.25:1) than other events. 7 of these were Nominal Group metaphors of the type NP of NP e.g. *the miracle of spring; the wakening of the earth*. Overall in the data, 25 of the 55 noun phrase metaphors were of this type, which metaphor identification tests to be reported later showed to be readily recognisable to adults (Chapter 8), and which Broderick found canonical in children's stories (Broderick 1992). Since the Assembly talk was comprised mostly of two stories, this may be the link, or, more likely, Nominal Group metaphors are used in both stories and assemblies because they are recognisable or striking in some way.

5.5.2 Verb Phrase metaphors

These were divided into 2 sub-categories:

1. Phrasal / Prepositional verbs, where the verb complement NP is Topic-related.

e.g. *we're going back to possession* (Apost - Tape 3: 117)

2. Verb Phrases without a preposition attached, and which were also usually more highly lexicalised

e.g. *make a mental note* (Apost.-Tape 3: 3)

or

Verb Phrases with an attached Vehicle-related Prepositional Phrase (i.e. preposition + noun phrase)

e.g. *the ... rocks fit into the overall picture of the age of the earth*

(Geol - Tape 5: 472).

The first type were almost twice as frequent as the second, even though verbs with *have*, *etc* had been omitted. The exception was again in the Assembly, which featured more highly lexical / schematic verbs; even the Phrasal / Prepositional verbs were of this type: *look for*, *deliver from*, *lead into*. This relates to the higher density of information content in the Assembly talk.

Delexical Phrasal / Prepositional verbs included:

go through / back to / on / into / up in / away from

come from / back / up with / out of

get .. out of the way / down to / on to / to

look at / for

The delexicalised nature of many verb metaphors is somewhat counter-intuitive, as it might be expected that metaphors would make use of more schematic lexis in order to have rich and striking domain transfer. What we are seeing here, though, is not the use of rich poetic metaphors, but rather exemplification of the characteristics of prosaic metaphor. In spoken interaction, items with high indexical valency can also be made rich and productive carriers of metaphorical meaning.

In summarising findings about the grammatical form of metaphors, I conclude that,

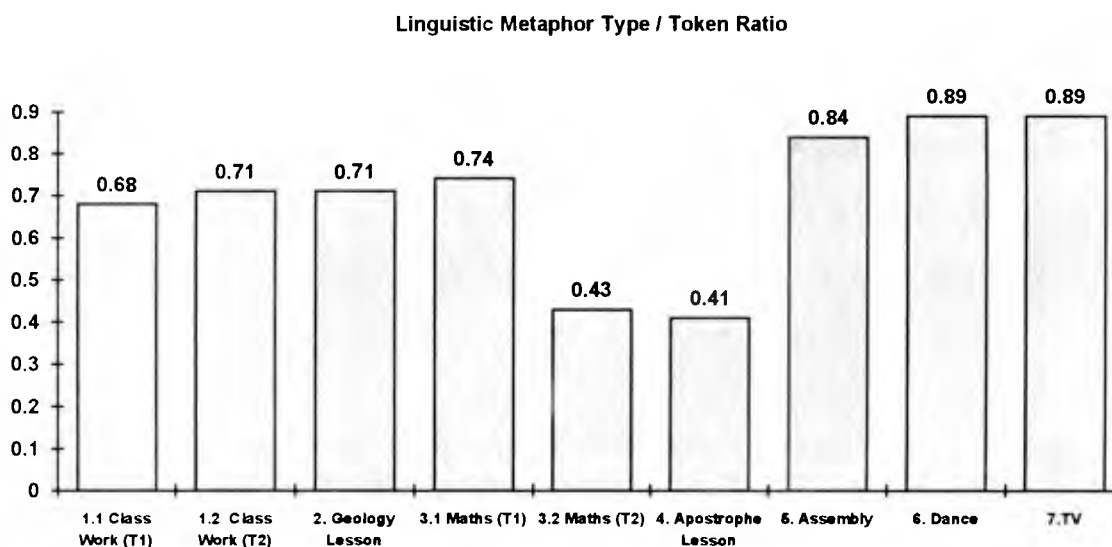
- ◆ although there is some variation in use of grammatical forms with the content and genre of the discourse, a typical prosaic metaphor in classroom is likely to be a verb metaphor, and probably has a prepositional or phrasal verb as Vehicle.

In the next section, the analysis of metaphor density takes into account repetition of lexemes in the Vehicle terms of metaphors.

5.6 Metaphor Lexical Type / Token ratio

The repetition of metaphors, in whole or in part, across the turns of the interaction appears to be potentially important in providing support for comprehension, and will be investigated in detail. As a quantitative measure, the lexical type / token ratio for each event was calculated by counting the number of distinct lexical types of metaphor Vehicle terms, disregarding repetitions and reformulations of a particular lexeme, and dividing this by the total number of metaphors found in each event. So, for the Maypole Dancing lesson, 36 distinct lexemes were used in producing the 41 metaphors found in the data. This gives a Type / Token ratio of 0.84. The full set of results is displayed in Figure 5.5 below.

Figure 5.5 Linguistic metaphor Type / Token ratio



The lowest T/T ratio, i.e. the highest rate of repeated or reformulated metaphors, is found in the Apostrophe lesson, closely followed by Maths lesson, both taught by teacher T2. In these events, each metaphor lexeme was used on average 2.4 times, but this averaging actually hides very frequent use of a small number of lexemes. For example, in the Apostrophe lesson, the teacher uses *talk about*, in various forms, 11 times to refer metaphorically to processes of thinking and learning, or to mean "study / concerned with"

when we were talking about apostrophes last week we were talking about contractions
(Apost- Tape 3: 116)

The highest T/T ratio, i.e. the highest rate of one-off metaphors, is found in the TV programme and the Dancing lesson, closely followed by the Assembly. In these cases, the reasons are less straightforward than merely personal style, but seem to reflect inter-related aspects of the content, format and modes of interaction. For example, the TV programme was basically a narrative account of the daily life of a deaf child used to illustrate deafness in general. The actual narrative text in voice-over had hardly any metaphorical language, the metaphors were found instead in talk inside the brief recordings of the child in various everyday contexts - the school, the shop, the disco. Since each extract was very brief, there was little or no repetition of any language feature including metaphor. The reason for the high number of one-off metaphors in the Dance lesson appears to lie, not in the type of content, but in the pressures of production and resulting frequent use of formulaic / idiomatic phrases, and this is further discussed in Chapter 5, Section 5.4.

- ◆ The average Type/Token ratio across the set of discourse events is 0.7, i.e. each lexical choice occurs on average 1.4 times. This suggests that metaphorically-used lexemes are often repeated at least once, and often more than twice; such repetition may be important for interaction and understanding.

The nature, and potential importance, of the repetition and reformulation of metaphors will become more obvious when I move from the discourse event to the level of Metaphor Framing Episode. Before moving to the level of the episode, I first consider the relation between metaphor density and metaphor type / token ratio.

5.7 Correlation between metaphor density and type / token ratio

Given the results of Sections 5.2 and 5.6 above, we might ask whether any correlation exists between metaphor density and lexical type/token ratio. To test this, Pearson's correlation coefficient (r) was calculated (Robson 1994 (a): 153).

The result gives $r = -0.21$, which implies that the correlation is negative, and significantly different from 0 at the $p < 0.05$ level.

- ◆ A negative correlation between metaphor density and type / token ratio is found, i.e. use of largely distinct metaphors can be expected to accompany limited use of metaphors, and conversely a large degree of repetition of metaphor types occurs with a high frequency of metaphor use.

5.8 Linguistic metaphors in Metaphor Framing Episodes

While the simple quantitative measures of metaphor frequency and density are of interest, they are clearly somewhat superficial. In this section I move to the next level of discourse, one level beyond the individual metaphor, and consider Metaphor Framing Episodes. Again, I begin with straightforward counts of frequency, later bringing content issues into the picture.

As described in Chapter 4, section 4.9, Metaphor Framing Episodes (MFEs) were extracted from the data by taking linguistic metaphors along with surrounding discourse, using topic, speaker/addressee and sequential organisation of the talk as guiding features. The effect of this is to group related metaphors together for analysis, giving a more subtle discourse picture than can be obtained from the coarser type / token ratio measures. I begin with raw counts of the number of MFEs in each event, and then move to look inside episodes, first quantitatively and later in terms of semantic content.

164 MFEs were found in the complete data set; Table 5.2 shows this broken down by discourse event:

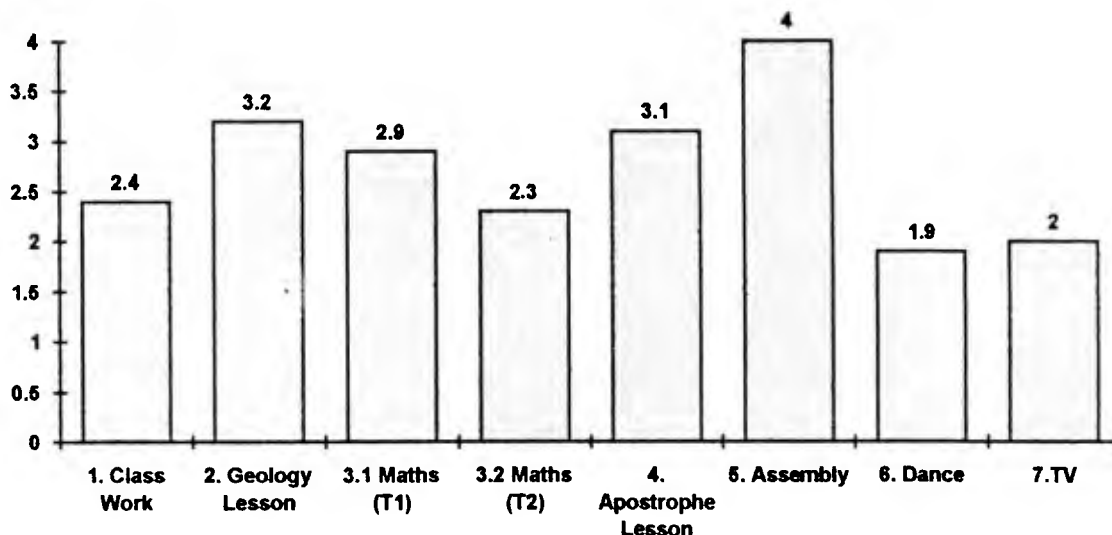
Table 5.2 Numbers of Metaphor Framing Episodes in each discourse event

Discourse event	Number of MFEs
Class Work with T1	40
Class Work with T2	5
Geology lesson	13
Maths with T1	12
Maths with T2	31
Apostrophe lesson	20
Assembly	11
Maypole Dancing	22
TV programme	10
TOTAL	164

Investigating metaphors within episodes showed that the number of metaphors within MFEs varied quite widely e.g. from 1 to 10 metaphors in the Assembly, between 1 and 7 in the Class Work (Teacher 1). However, when the average number of metaphors per MFE is calculated for an event, much less variation is seen. The average was calculated for each discourse event by dividing the total number of linguistic metaphors in that event by the number of metaphor framing episodes. Figure 5.6 shows the results obtained. (In this analysis, data from Class Work 2 has been merged with that from Class Work 1, since it only produced 7 metaphors in 5 MFEs, figures too small to be able to

make any meaningful statements. The closely similar results so far for the two sets of data provides additional justification for this merger. The actual metaphorical language of the two events was examined separately for the later qualitative analysis.)

Figure 5.6 Average number of metaphors per Metaphor Framing Episode for each discourse event



The mean of these averages is 2.7, and the Standard Deviation 0.71, so that once again the use of metaphor in the Assembly appears to deviate strongly from the pattern of the others, with a figure nearly 2 SDs from the mean. In fact, the Assembly transcript was very difficult to divide into episodes since it contained very little interactive discourse but was mostly narrative. The Metaphor Framing Episode as a unit appears to be somewhat genre-sensitive (Carter and McCarthy 1995) and most useful in the analysis of interactive discourse. Removing the Assembly data from the analysis shifts the mean of the averages to 2.5 and SD to 0.53. Metaphors in talk are like buses - they tend to come in threes, or at least in 2.5s.

- ◆ The clustering of these figures, apart from the Assembly, around the mean is an important result, suggesting that metaphors are grouped together in classroom talk.

The MFE results show that, in classroom interactive discourse, pupils encounter linguistic metaphors in groups of 2-3. I now move to the macro-level, of the whole discourse event from beginning to end, to investigate how these metaphor-rich episodes map on to observable teaching goals, returning after that to analysis of the semantic links between metaphors in the same episode.

5.9 Metaphor Framing Episodes and Teaching Sequences within discourse events

Through the results on metaphor use, a picture of the processing demands of metaphorical language within classroom discourse is beginning to emerge. We have seen thus far that the frequency of linguistic metaphor use varies across the different discourse events, and that linguistic metaphors, when used, often cluster together in adjacent turns of talk. In this stage of the analysis of metaphor in the classroom discourse, I examine how metaphor use interacts with the goals of participants and, in doing so, arrive at a description of the impact of metaphor in classroom discourse.

Discourse events were articulated, by teaching goal, into Teaching Sequences and nested sub-sequences, and Metaphor Framing Episodes were mapped on to the discourse event. It was then possible to analyse the pattern of Metaphor Framing Episodes within particular types of Teaching Sequence. The discourse events most amenable to this type of analysis were those in which a lesson proceeded from one sequence to the next at a fairly consistent rate, as in the Geology lesson or the Maths work. The Class Work data, in contrast, contained patches of teaching segments (Mitchell and Parkinson 1979) among the on-going individual work of the children. These teaching segments could be analysed into Teaching Sequences, and some are used here for illustration, although are not included in the quantitative measures. The MFEs found in the Class Work data will be used in internal analysis of MFEs reported in later sections of this chapter. The Assembly and TV programme did not obviously articulate into Teaching Sequences and so were also omitted from this part of the analysis. As can be seen from Table 5.3 below, the five discourse events analysed (15,421 words) yielded 188 Teaching Sequences, which were then examined for their metaphor content. An example of the mapping between Teaching Sequences and Metaphor Framing Episodes in the Geology lesson can be found in Appendix 2.

The first set of results from this two-way analysis concerns the number of each type of Teaching Sequence in each event, and the percentage of these that contained at least one Metaphor Framing Episode. Since Teaching Sequences are determined by teaching goals, this gives some indication of the relation between metaphor use and teaching goals.

Table 5.3 Teaching Sequences containing MFEs

Teaching sequence	Number of occurrences in data	Number which include at least one MFE	% of sequences including at least one MFE
1. Instructional			
1.1 explanation	36	20	56%
1.2 exemplification	6	2	33%
1.3 modelling	9	3	33%
1.4 checking understanding	8	5	63%
1.5 recap	15	14	93%
2. Framing			
2.1 Organisational	14	2	14%
2.2 Agenda setting	45	25	56%
3. Feedback	41	26	63%
4. Control	11	7	64%
5. Information Search	3	1	33%
TOTAL	188	99	50.8%

SD = 22.6

- ◆ The results indicate considerable variation in the extent to which metaphor is used in the discourse around different teaching goals:
 - ◆ a very high use of metaphor in Recapping sequences
 - ◆ moderately high use in Explanation, Checking Understanding, Agenda Setting, Feedback, and Control sequences
 - ◆ a low occurrence of metaphor in Organisational, Modelling, and Information Search sequences.

5.10 The impact of metaphor in classroom discourse

A more qualitative analysis of the impact of metaphor in teaching sequences reveals features of metaphor central to particular discourse uses. It will be recalled that "impact" is broken down into

- ≈ ideational: referring to the cognitive content of the metaphor and its effect on understanding
- ≈ interpersonal: referring to sharing of attitudes and values through the metaphor
- ≈ interactional: referring to how the on-going discourse is affected by the metaphor

By examining uses of metaphor in terms of their impact on the sequence and the discourse event, it became clear that, although uses of metaphor often show all three types of impact, analysis in terms of goal-determined teaching sequence suggests that many uses of metaphor have one type of impact which predominates. Interactional use of

metaphor is particularly obvious in the construction of a shared agenda for the procedures of classroom events, such as the work that is to be done or how that work is to be organised. Some systematicity was observed in teachers' choice of metaphor for sharing or negotiating intentions with pupils. The ideational impact of metaphor is predominant in analysis of Explanation sequences, and to a lesser extent Recapping sequences, while Feedback and Control sequences demonstrate clearly how metaphor can have an interpersonal impact. Each of these will be reported, beginning with examination of how metaphor operates procedurally in classroom discourse.

5.10.1 The interactional impact of metaphor in classroom discourse

As explained earlier, Framing sequences of classroom discourse were subdivided into Organisational and Agenda Setting, where the first dealt with "hardware", such as pencils, chairs, the tape recorder or worksheets as pieces of paper, and the second with the content or process of lesson or task. This was usually an unproblematic distinction, with some care needed in the Dance lesson to distinguish between instructions as to where to stand (classed as Organisational), information about how the steps of a particular dance were to be performed in the next few minutes (classed as Agenda Setting), and more conceptual explanations of, for example, how steps fitted together in the dance (Instructional).

Framing sequences occurred at the beginning of each event, and also within events where the action shifted from one task to another. While Organisational sequences contained very little metaphor, more than half of the Agenda Setting sequences, which were the most frequently occurring type of sequence, included at least one Metaphor Framing Episode.

- ◆ Metaphorical language is frequently used in Agenda Setting sequences, and with two major purposes: to negotiate with pupils what shape the lesson will take in general terms, and to summarise the content to be covered as the event progresses.

These purposes are exemplified in the following extracts. In Extract 3, line 1, teacher T2 tells the children what will happen in the lesson - *we're going to go over (the maths test questions)* - and, in line 4, what they are to pay attention to - *you'll see how close some of you were to getting them right*. In Extract 4, line 3, teacher T1 explains what she intends to do in the geology lesson that is about to take place - *to give you a little bit of information* - and, in line 10, summarises what the lesson is about - *there are really two things we're going to look at*.

Extract 3 *Negotiating the process of a Maths lesson*

Maths lesson - Teacher T2

- 1 what we're going to do (.) is (.) we're going to go over them now (.) because (.) you
could have (1.0) got more right than you did . . .
. . . put your books down in front of you (2.0) and we'll do them (.) on the board (.) and
you'll see (.) how close some of you were (.) to getting them right (2.0)
- 5 ... okay (.) very quickly over them (7.0)

(Maths T2- Tape 2: 37 - 45)

Extract 4 *Summarising upcoming content in the Geology lesson*

Geology lesson - Teacher T1

- 1 now what I'm going to do (.) this afternoon (1.0)
because I can't think of any other way to do it (1.0)
is to give you (.) a little bit of information (2.0)
on which (.) we can build (.) our understanding (1.0) of (.) rocks (4.0)
- 5 and the minerals that come out of rocks (1.0)
and also (.) how rocks weather (2.0)
in other words (.) what happens to rocks (1.0)
when (.) the snow (.) and the wind and the ice and the rain and the temperature (1.0)
acts upon them (.)
- 10 so there are really two things we're going to look at (2.0) this half term (1.0)
and the other is (.) about the minerals (.) that are in them (.) that we can use

(Geology - Tape 5: lines 195 - 205)

I first consider in more detail the use of metaphor in negotiating the procedure of the lesson that lies ahead. Some systematicity across discourse events was evident in this use of metaphor, and, although I resist the temptation to apply too swiftly the label of the conceptual metaphor of the journey (Lakoff and Johnson 1980) or source-path-goal (Gibbs 1994:147) for this, the talk about classroom procedures metaphorically in terms of physical progress does warrant some detailed attention. Both individual tasks, such as writing a diary, and class tasks, such as completing a worksheet or going over the answers to a Maths test, were described in terms of physical movement. While some of these remained at a more general level of purposeful moving, others had nuances of more specific aspects such as searching, arriving and so on. At the most general level, the verbs *go* and *come*, often followed by prepositions, were consistently used to refer to *working, writing, thinking or talking about*:

- let's quickly go through them (= exercise items)* (apost - Tape 3: 172)
we'll come back in a moment to .. (geology - Tape 5 : 282)
do you want to go on and do day three? (cwt1 - Tape 1: 720)
see how it goes (cwt1 - Tape 1: 741)

A verb of motion is often combined with items relating to location and vision in stretches of language such as:

you can see where you've got to go from here (cwt1 - Tape 1: 591)

how far on are you with that? (cwt1 - Tape 1: 509)

Directions and outcomes, or "paths" and "goals" (Gibbs 1994: 147), are also sometimes expressed through linguistic metaphors in Agenda Setting sequences:

how might we arrive at a fairly accurate result? (maths T1 - Tape 6: 135)

let's do it the long way (maths T1 - Tape 7: 6)

you're on the right track (maths T1 - Tape 7: 50)

you'll see how close you were to getting them right (maths T2 - Tape 2: 38)

When extra effort is needed in the Maypole dancing lesson, the teacher says, encoding her encouragement in a metaphor Vehicle congruent with the progress metaphor:

I'm really pushing you this afternoon (Dance - Tape 4: 182)

and when the children make the effort, she suggests (in a Feedback sequence), perhaps with some sense of completing their task as a race well run:

I think you all deserve a medal (Dance - Tape 5: 91)

In another semantically linked metaphor in a Feedback sequence, Teacher T2 when suggesting a strategy for dealing with tricky maths questions seems to extend the metaphor in the sense of slowing down the physical movement

take it step by step (Maths T2 - Tape 2: 86)

It would seem then that we have some justification for claiming this as an example of a conceptual metaphor at work systematically in interaction, prototypically occurring in Agenda Setting sequences, but also appearing occasionally in other sequences. However, the interest would seem to lie, not in applying a very general label in Lakoff's preferred A is B mode, which risks losing useful interactional detail, but rather in exploring how aspects of the conceptual metaphor are used in discourse.

The verbs used metaphorically in Agenda Setting sequences are often fairly delexicalised, and together with their collocated phrases appear to have an interpersonal impact too, in that they may mitigate any threat in the talk about work to be done, and encourage pupils

to engage mentally with the upcoming event. The metaphorical journey is made to seem fairly gentle, and well-supported by the teacher as guide.

as you go along

(apost - Tape 3: 4)

let's go into that

(geol - Tape 5: 224)

Pre-modifiers in particular seem to downplay any challenge that might arise from nouns:

make a little mental note

(apost- Tape 3: 5)

give you a little bit of information

(geol - Tape 5: 196)

An episode from the Class Work event shows how the metaphorical language in Agenda Setting is interspersed with non-metaphorical language, such as *will have done*, *starting on*, *correct*. In this case, the use of systematically linked metaphor opens and closes the episode and seems to provide the skeleton, on to which non-metaphorical language is added. Some of language falls into the fuzzy boundary between metaphor and non-metaphor, illustrating the types of category decision the analyst is forced to make. The use of *go into* in line 3 is not classed as metaphor, since physical movement of picture into the personal record is implied. Also refused metaphor status is the verb *carry on* in line 8. A more fanciful interpretation might link this verb to burdens being carried on a journey; in my categorisation this verb use was classed as non-metaphorical.

Extract 5 Conceptual metaphor of "source-path-goal" in Class Work

<i>Class Work with T1</i>	
1	T: okay (.) well you can see where you've got to go from (.) here (.) on can't you? what I'm trying to do is to get (.) diary for day one and an illustration (.) day two and an illustration (.) so you've got some writing and a picture to go into your personal (.) record (.) of the week (1.0) alright? (2.0) some of it (.) at some point all of you
5	will have done some computer work (1.0) for your writing (1.0) but a lot of it's going to be done by hand (.) isn't it? (.) can you see where you've got to go from here? (.) um we'll let Ellen and (.) Heather carry on with their writing now (.) but we must correct your work you two (1.0) to get that printed out (2.0)
10	right (.) Marie's table (.) Marie you were doing your own work and illustrations (.) how far (.) how far (.) on are you with that?
(cw T1 - Tape 1: 590-600)	

It may be significant that the use of this type of metaphor in Agenda Setting sequences occurs with both teachers, since, as we will see below, they otherwise organise lessons quite differently.

The second use of metaphor in Agenda Setting sequences, exemplified in Extract 4, relates to content rather than process. Here metaphor also acts ideationally to summarise through the rather general Vehicle terms employed:

come out of rocks (geol - Tape 5: 198)

acts upon them (geol - Tape 5: 200)

Again, metaphorical and non-metaphorical language (*what happens to rocks..*) are interlaced in the episode, and shortly I will examine more precisely the ways in which they jointly contribute to the content.

While such metaphorically loaded Agenda Setting sequences occur typically in event openings, various other types of sequences, also using metaphor, act to frame the closing of events. The Geology and Maths (T1) lessons have Recapping sequences as pre-closing sequences, and then close with Agenda Setting sequences relating to the next event. Maths (T2) and Dancing conclude with Feedback sequences, and the Apostrophe lesson appears to drift to an end as pupils complete the exercise and the teacher chats with those who have finished. Recapping sequences seem to act as a kind of interactional complement to Agenda Setting sequences in their Framing role, since they, too, often appear to play a kind of "agenda control" function in the teacher's orchestration of the lesson, and they too use metaphor to refer to both process and content, as they act to include the pupils in shared understanding of what has been done so far.

Firstly, metaphor in Recapping sequences can be seen to be part of the metalanguage used to refer to process, usually through a Verb phrase which recaps an agenda previously set.:

we're saying that .. (Maths T1 - Tape 7: 64)

that's what we're aiming at... (Dance - Tape 4: 57)

We can note in these examples the use of inclusive *we*, that seems to suggest an interpersonal impact in aligning teacher and pupils as engaged in a joint enterprise.

Secondly, metaphor is employed in the repetition or generalisation of content in Recapping sequences, in which role it may be nominal or verbal. In the Dance lesson, the teacher used the phrase

spokes in a wheel (Dance - Tape 4: 148)

to recap for the pupils the pattern they should make in the dance she had just explained to them

In the Maths lesson, pupils working through a calculation orally were told at an interim stage of adding and carrying to

put the one in your head (Maths T2 - Tape 2: 76)

before adding the next column of digits.

So, although in Agenda Setting and Recapping sequences the ideational and interpersonal impact of metaphorical language is observable, what emerges more strongly, and what has been reported here, is the interactional impact of metaphor on setting up and controlling the "agenda" of the discourse event:

I now turn to focus on the ideational impact of metaphor.

5.10.2 The ideational impact of metaphor in classroom discourse

In this section I report findings relating to what is often considered one of the primary functions of metaphor, explaining something new or difficult in terms of something already known.

Metaphor is a primary way in which we accommodate and assimilate information and experience to our conceptual organization of the world. In particular, it is the primary way in which we accommodate *new* experience. Hence it is at the source of our capacity to learn and at the centre of our creative thought.

(Kittay 1987:39)

If Kittay's view is valid, we would expect classroom discourse, or at least the Instructional sequences within it, to make extensive use of metaphor, and a key research issue would concern the selection of appropriate metaphors to suit the zones of proximal development (Vygotsky 1962) of pupils. From this point of view, the figures for use of metaphor in Instructional sequences of various types do not seem particularly high, with the procedural aspects of Recapping sequences accounting for a high proportion of metaphor use. The transcriptions and field notes show that the teachers employed a range of strategies for helping the children "accommodate new experience", including

- practical demonstration
(squashing a polystyrene cup to show the effect of pressure on rocks)
- practical activity
(having the children walk around the field counting paces to calculate an average)
- writing about experience
(the diary of their trip)
- exemplification and non-metaphorical analogy
(reference to the stone used in the entrance to a local shop)

Metaphor was just one among these many strategies, and not obviously the "primary way".

However, metaphorical language was employed to help the children understand in just over half of the Explanation sequences, and was often used when teachers checked understanding. The 20 instances of metaphor in Explanation sequences have been classified in terms of the way in which metaphor seems to be used to try to make particular content accessible to the pupils. The second empirical investigation explores the interpretive processes of the pupils when they encounter such metaphors. In this first investigation, I report what the pupils are exposed to.

Metaphor was used in just over half the explanation sequences, in connection with a range of concepts, properties and processes. For example:

geology

crinoids are mini-animals

dance

you are spokes in a wheel

maths

eighteen shared by two

religion

born of the one light

spring

the wakening of the earth

The concepts, properties and processes that are the Topics of the linguistic metaphors in the data appear to be potentially problematic for pupils along (at least) four independent dimensions of cognitive demand:

- degree of abstraction (how abstract or concrete an idea is)
- degree of generality / specificity (position in a general - specific hierarchy)
- degree of familiarity (how far an idea concerns familiar content)
- degree of complexity (how complicated an idea is)

The independence of these dimensions can be illustrated with some examples from the data:

1. an idea may be new, but not particularly abstract or complicated:

- e.g. crinoids (Geology lesson);
the pattern of a dance (Maypole Dancing)

2. an idea may be abstract and thus quite difficult for the pupils, even if it is familiar
e.g. mental processes such as thinking and memory (Maths lesson)
religious ideas (Assembly)

3. an idea may be complicated, but not necessarily abstract or unfamiliar
e.g. how to use apostrophes (Apostrophe lesson)

The data analysis reveals a range of ways in which metaphor Vehicle - Topic links may function ideationally to help with these types of cognitive challenge:

- **Familiarisation**

The unfamiliar may be linked to something familiar, although not necessarily less abstract or simpler

the miracle of spring (Assembly- Tape 2: 123)

shortening the word = use of apostrophe for contraction (Apost - Tape 3: 68)

- **Approximation**

The new or difficult concept may be approximated to another, assumed to be already known

the derivation of people's names from the place they live in was characterised as
a sort of nickname (cw T1-Tape 1: 783)

the process of fertilisation of an egg by a sperm as

a (sort of) chemical reaction (cw T1-Tape 1: 112/132)

- **Animation**

An unfamiliar or complex concept, process or property may be described using animate verbs, including personification

rocks are *formed by fire* (Geol - Tape 5: 352)

crinoids *wave their arms* (Geol - Tape 5: 300)

- **Concretisation**

An abstract idea may be made encoded in more concrete lexis, assumed to be familiar, usually as a whole clause or phrase Vehicle

do it in your head = perform a particular mental process (Maths 2 - Tape 2: 55)

• Simplification

A more simple or straightforward, usually more general, term may be used for the difficult concept, which remains an implicit Topic

the key is to keep these shoulders together (Dance - Tape 4: 143)

they hadn't looked at what had been asked for = taken into account what was asked for in a maths problem (Maths T2 - Tape 2: 20)

what's classification a big word for? = what's the meaning of classification? (Geol - Tape 5: 213)

Simplification would include the use of general purpose, delexical verbs such as *go*, *come*, *find*, to refer to quite complex processes.

• Comparison

The new or difficult concept may be directly related through comparison to something assumed to be more familiar, concrete or simple, with possible transfer of features and relations, via analogy. Both Topic and Vehicle are explicitly mentioned.

volcanic lava is said to be *like runny butter / wax* (Geol - tape 5: 367/ 376)

trees in a child's drawing are said to be *like little lollipops* (cw T1-Tape 1: 632)

An appropriate choice of metaphor Vehicle is clearly crucial in the effectiveness of metaphor. If the speaker's assumptions either under- or over-estimate the listeners' current knowledge, an inappropriate Vehicle may be chosen. The data provides some suggestive evidence on this. For example, there is some evidence that the concrete does not necessarily coincide with the familiar:

Louise asks another pupil about a Maths problem - *where does the crow fly?*
(cw T1-Tape: 518)

On the other hand, examination of the Vehicle terms used across the discourse events shows the ideational use of metaphor in educational discourse frequently shifting the cognitive content significantly downwards to a much more simple level. To remind ourselves that this is not an inevitable consequence of the use of metaphorical language to talk about complex ideas, we need only look at the metaphorical language in one of the hymns the children sang in the assembly:

Morning has broken
Like the first morning

....

Praise for them *springing*
Fresh from the Word!

....

Mine is the morning
Born of the one light
Eden saw play.

The consequences of inappropriate Vehicle selection, and in particular of the downwards cognitive shift that characterises much of the classroom data, will be explored in the discussion of results in the next chapter.

- ◆ In summary, metaphor has an ideational impact through a range of ways in which it mediates the cognitive demand of curriculum content. Data analysis has raised the issue of the appropriacy of mediation via metaphor, and the possible risk of oversimplification through metaphor.

5.10.3 Conceptual metaphor and literacy processes in classroom discourse

In Section 5.10.1, above, the conceptual metaphor of a 'journey' was seen applied systematically to classroom processes. In this section, I report a further systematic use of metaphor that is of potential educational significance ideationally, the use of conceptual metaphors of *hearing and telling* to describe literacy skills and processes.

The data shows that inanimate objects are sometimes metaphorically held to talk:

this tape is telling me something (Dance - Tape 4: 156)

a noun which is talking about more than one thing (is plural)

(Apost - Tape 3: 315)

but it is in the realm of written language that the systematic use of terms linked to talk can be observed.

One set of uses is metonymic rather than metaphorical: when teacher T1 asks a child to read aloud a story, she comments:

I haven't heard this one before (cw T1-Tape 3: 445)

I've never heard a story before that ... (cw T1 -Tape 7: 234)

This use of *hear* is only marginally, if at all, metaphorical, in its joint reference to aural input and making sense of a text, since the teacher will indeed hear it as the child reads aloud. However, uses of verbs like "*hear*" are found extended away from metonymy and into metaphor, apparently implying that written text can yield its information in metaphorically spoken form:

it (= the story) does talk about racoons (cw T1 - Tape 7: 238)

whether I need to say (= write) brought or bought (cw T1 - Tape 1: 701)

(your writing) sounds lovely (cw T1 - Tape 6: 670)

that's what it means but it doesn't say that (cw T1- Tape 3: 666)
a big circle that says humans (i.e. a set labelled "humans") (Geol : 238)
the next little bit (of written text) says.. (Geol: 426)

The conceptual metaphor

EXTRACTING MEANING FROM TEXT IS LISTENING TO TALK

is thus somewhat systematic and spread across sequences and events. Ideationally, the metaphor may be useful to children in making links between what they are already experts in (the Vehicle domain of *talking and listening*) and the less familiar Topic domain of *literacy processes*. However, the metaphor also demonstrates simplification, a downwards cognitive shift in which the Topic domain processes are made to seem simpler than they actually are. This mitigation and alignment through metaphor may be important interpersonally, but, I would argue, may be ideationally risky, unless children are also helped to understand the new demands of literacy processes and to acquire the new skills to meet these demands.

The extent of the use of this particular conceptual metaphor is not entirely clear. Terms from the domain of *talking and listening* are used with different Topics; other lexical items, including metaphorically used terms, are also used as Vehicle to refer to *extracting meaning from text*. For example, the data shows that teacher T2 does not make any use of this conceptual metaphor when going through the Maths test, although she did talk about making sense of the written test. Moreover, in her apostrophe lesson she uses the Vehicle *talking about* 11 times for the different (metonymic) Topic domain of *referring to / studying*:

we were talking about apostrophes (Apost: 115)
we'll talk about that in a minute (Apost: 168)
we were talking about "isn't" (Apost: 221)

It is also not clear whether such choice of metaphor is incidental, rather than deliberately selected for specific educational or social purposes. Both deliberate and incidental uses are potentially important; without awareness of what one uses incidentally, and thus what children are accustomed to hearing, it becomes more difficult for a teacher to refine choice of language to promote learning. Explicit talk about mental processes or strategies for tasks is likely to be important in cognitive development in middle childhood, contributing to learning through the proceduralisation of declarative knowledge.

One of the main criticisms of conceptual metaphor theory as developed by Lakoff and colleagues derives from the way in which inferences are made from language to thought. It thus seems appropriate to end this brief discussion on a conceptual metaphor for literacy with a caution; during the discussion after the TV programme, teacher T1 produced the following idiom / proverb as she warns the children not to judge others by their appearance:

what you see might not actually tell you the true story (TV - Tape 1: 539)

5.10.4 The interpersonal impact of metaphor in classroom discourse

The interpersonal impact of metaphor is most striking in the mapping of Feedback and Control sequences and Metaphor Framing Episodes. Feedback sequences were the second most common type of teaching sequence after Agenda Setting, with two thirds of sequences containing at least one Metaphor Framing Episode. Control sequences were less frequent, but exhibited a similar frequency of metaphor use. Across the discourse events, two types of Feedback can be separated, with metaphors used in both:

Evaluative Feedback

Evaluative Feedback rates performance or product, sometimes (as with T2 above) setting up shared norms for the class

you have to have a good little bit of memory here (Maths 2 - Tape 2: 110)

I think you all deserve a medal (Dance - Tape 5: 91)

Strategic Feedback

Strategic Feedback includes advice on strategy. In this type of feedback, metaphor often encodes the content of the strategy

take it step-by-step (Maths 2 - Tape 2: 86)

the secret of this skipping thing (Dance - Tape 4: 102)

Strategic feedback appears less often than might be expected, and metaphorical language used in strategic feedback often remains at a very general level, and may sometimes be less than maximally helpful to the pupils. In Extract 6 below, the teacher advises a pupil on strategies for answering mental arithmetic questions. She describes the strategy in general in line 3, suggests how more precisely the child can do this in line 5, and then models and summarises one way of gaining time in lines 6 and 7.

Extract 6 Strategic feedback given to pupil in mental arithmetic (Teacher T1)

Maths with T1

- 1 T: how many pence in ten pounds? (3.0)
think before you speak (2.0)
give yourself a little time (2.0)
you should watch the others (.)
- 5 to find out all the strategies they have (.) for buying time (.)
they sort of go (.) umm (.) and that's that's to tell me (.)
I'm still thinking but I need a bit of time

(Maths T1 - Tape 6: 93-96)

Feedback sequences often move quickly into Instructional sequences, which present explanations of alternative ways of doing or thinking, which may implicitly provide additional negative feedback.

Analysis of the data relating to Evaluative Feedback reveals clearly the distinct personal styles of teachers T1 and T2 in the way they use evaluative feedback in their discourse with pupils. Teacher 1, who is both the class teacher and Headteacher, appears to have a child-oriented approach to classroom organisation, discipline and feedback (Galton and Williamson 1992) which is manifested in her use of metaphor that aligns her with the pupils rather than distancing, through acknowledgement of her own problems and/or use of an inclusive pronoun:

my brain can't manage that... (Maths 1 - Tape 6: 98)

when we say got or get ...we're actually being a little bit lazy
(cw T1 -Tape 3: 408)

Metaphors also appear to be used to mitigate the force of negative feedback to a pupil, sometimes through the use of idiomatic phrases (Drew and Holt 1988)

you're on the right track (Maths 1 - Tape 7: 50)

She rarely tells a child directly that they have done something inadequately or incorrectly, but rather suggests how to put things right, often employing metaphor and idiom to humorous effect and thus mitigating the potential threat of negative feedback:

not like this ... it looks funny (3.0) like Charlie Chaplin (Dance - Tape 5: 70)

if you don't stand completely still (.) you jigger it (Dance - Tape 4: 188)

Teacher 2 on the other hand appears to have a more content-oriented approach to evaluative feedback and control, at least in the data analysed here. In the Maths lesson, 40% of teaching sequences are classified as Feedback sequences, and they permeate the

discourse from the very first exchange, often setting up norms against which the children's work is evaluated (see, for example, Extract 2 above). She has favourite metaphors, using various forms of the lexeme *think*, frequently used to imply conscious and determined mental effort that achieves desired results, as in Extract 7 below. The decision to include this use of *think* as a linguistic metaphor was partly justified by its frequency and somewhat idiosyncratic nature.

The teacher did use the verb non-metaphorically, sometimes in the same episode as a metaphorical use:

non-metaphorical: *I **thought** that was really a give-away*

...

metaphorical: *they didn't **think** (.) they forgot about that zero*

(Maths T2 - Tape 2: 153 - 170)

Uses of the verb *think* like the first example above, referring to mental processes of reflection, were not counted as metaphorical, but the second type of use seemed to imply something far beyond reflection, such as the application of mathematical processes, skills and strategies, which the teacher knew about, but which, through the choice of the verb *think*, remained hidden from the pupils. Metaphorical status, in this study, was finally justified by the potential pedagogic implications of the lexical choice.

Extract 7 Evaluative Feedback in Maths lesson (Teacher 2)

Maths T2

T2: on Friday (2.0) we did some mental arithmetic (.) do you remember ? (2.0)
 and I said I was going to give you (.) a set (.) which (.) were (.) quite difficult (2.0)
 but just to see who could really (.) use their head (2.0)
 and **think hard** (4.0)
 and work things out (2.0)
 with a **bit of thought** you would do (.) not too badly (2.0)
 well (.) it worked (1.0)
 because I saw the people (.) who (.) used their heads (.) and **thought** (2.0)
 and I found out the people who just looked at the question and (1.0)
 didn't **think** too much at all (.) anyway (.)

(Maths 2 - Tape 2: 7-13)

Such feedback seems to be content-oriented, rather than child-oriented, and in interpersonal terms seems to have an emphasising and distancing function rather than an aligning function (Graumann 1994). This type of sequence, in which evaluative feedback on performance in the maths test presents the pupils a (non-specific) performance norm

against which they can measure their own results, occurs in 9 out of the 14 questions worked through as a class, so that, even over the course of one lesson, its potential impact was significant.

The effect of preferred personal style on discourse is again apparent when Control Sequences are analysed. Neither teacher was required to use many Control sequences, probably because the class was relatively small (15 pupils) and well-behaved. Control sequences were most evident in the Dance lesson, where the pupils were spread around the hall, and moving. From what I have shown of Teacher 1 's child-oriented style, it will not be surprising that, when there is a need to pre-empt or stop unwanted pupil behaviour, metaphor and idiom are used to mitigate the force of control statements:

try and pick your feet up (Dance - Tape 4: 29)

you sort yourself out (Dance- Tape 5: 80)

This type of language avoids giving direct orders to pupils, which would present the opportunity to disobey, and further problems for the teacher.

Hyperbole appears as part of control sequences, when unusually high levels of annoyance are felt

I thought at least something was dead (Dance - Tape 5: 14)

Metonymy is also used in Control:

I want all your eyes looking at me (cw T1 - Tape 1: 550)

- ◆ The interpersonal impact of metaphor is most clearly demonstrated in Feedback and Control sequences, but is also evident in other types of sequence. Interpersonal impact is effected through the mitigation of potentially threatening cognitive demand, by encouraging engagement with classroom activity, and through distancing or alignment between discourse participants.

5.11 Personal style in the use of metaphor

I bring together at this point the differences in personal style in the use of metaphor as revealed by various analyses:

- Although in terms of gross metaphor density, discourse event seems to influence metaphor use more than personal style, finer-grained analysis reveals differences between teachers T1 and T2 in their metaphor use:
 - in the frequency and nature of use of metaphorical idioms

- in the frequency of repetition of certain preferred metaphors
- in the semantic content of preferred metaphors used interpersonally, reflecting attitudes to teaching and learning

I conclude that

- ◆ individuals may choose and use prosaic metaphor in distinct ways, with interpersonal use reflecting their attitudes and values. Pupils may thus receive different, and perhaps conflicting, messages about attitudes and values in classroom discourse.

5.12 Language within Metaphor Framing Episodes

This section and the following one report results of the analysis of the interplay of metaphorical and non-metaphorical language within episodes. Analysis so far has not examined the ideational links between metaphors very deeply but, as the analysis moves inside Metaphor Framing Episodes, it becomes clear that metaphors were being repeated, being adjusted through reformulation, and often being explicated in various ways. The ideational impact of repetition and reformulation may be important in the negotiation of meaning and the construction of shared understanding through the interaction, and is thus held to be in need of closer analysis. Starting from the linguistic metaphors identified, it was possible to examine both how they related to other metaphors in the same Episode and how they related to non-metaphorical language in the Episode. The results suggest that metaphorical and non-metaphorical language tend to work in quite different ways within MFEs.

5.12.1 Analysis of MFEs

The ideational impact of metaphor was investigated through analysis of the types of relations between the ideational content of metaphor Vehicles in the same MFE, and of the various ways in which metaphor meaning was developed in interaction. I took as a starting point the model of analysis of lexis in conversational data derived by McCarthy (1988), which describes how lexis more generally works interactively in talk. In that model, the following categories were derived from samples of everyday conversation:

1. Repetition of lexical items
 2. Reiteration of lexical items: under this heading, 4 sub-categories are described:
 - 2.1 change of item retaining same sense
 - 2.2 change of item for opposing sense (contrast)
 - 2.3 change of item for inclusive sense
 - 2.4 change of item for sense increment (gloss, expansion, redefinition, intensification)
- (adapted slightly from McCarthy 1988:185)

Applying this model to the data, it became clear that Repetition of Vehicle terms was important, that Relexicalisation (2.1) and Contrast (2.2) were 'done' metaphorically, but that the development of the meaning of metaphors through relations of hyponymy and superordination (2.3) or sense increment (2.4) were 'done' non-metaphorically. The non-metaphorical development of meaning was thus separated in analysis from lexical work done metaphorically.

In addition to repetition and relexicalisation of Vehicle terms, other patterns of use of metaphor Topic and Vehicle lexis with episodes are possible, and these were also analysed. Table 5.4 summarises the ideational links between metaphors in MFEs which were analysed.

Table 5.4 *Possible ideational links between metaphors in the same MFE*

<i>relation of new Topic to initial Topic</i>	<i>relation of new Vehicle to initial Vehicle</i>	<i>Label given to relation between Topic~Vehicle pairs</i>
Topic stays the same	Vehicle is the same, ellipited or has slight change in morphology	Repetition
Topic stays the same	different Vehicle	Relexicalisation
opposing Topic	different Vehicle	Contrast
linked Topic	different Vehicle, but connected through form or meaning.	Connection

5.12.2 The data set for MFE analysis

The Class Work data was added to the data set for this analysis, since MFEs were clearly identifiable within the on-going talk and activities. The data set thus consists of 6 discourse events, transcribed in 24,700 words (Table 5.5).

Table 5.5 *Data set for analysis of MFEs*

Discourse event	Number of words transcribed
Class work	9296
Geology lesson	2578
Maths lesson (T1)	2286
Maths lesson (T2)	4547
Apostrophe lesson	2831
Maypole Dance practice	3179
Total no of words	24720

In the 6 discourse events analysed in this section, 143 MFEs were identified, around 343 linguistic metaphors.

5.12.3 Clustering of metaphors in interaction

The Metaphor Framing Episode was set up as a unit of analysis to cater for the observed clustering of related metaphors close together in interaction. A first quantitative result is to do with the clustering of metaphors, and shows that metaphors are more likely to occur together than singly. When MFEs with only one metaphor are separated from MFEs with more than one metaphor, it is clear that in each event except the dancing lesson, multiple occurrence of metaphors is a common pattern (Table 5.6).

Table 5.6 *Single and multi- metaphor MFEs*

Discourse event	No of single metaphor MFEs	No. of MFEs with more than one metaphor
Class work	20	25
Geology	4	9
Maths 1	2	10
Maths 2	14	17
Apost	8	12
Dance	12	10
TOTAL	60	83

Furthermore, in multi-metaphor MFEs, it is common to encounter 3 or more metaphors clustered together, so that the clustering is a distinct phenomenon rather than a gradual one. The number of metaphors in multi-metaphor MFEs was averaged for each event, giving an overall average of 3.5 metaphors per Episode (SD = 0.63). (Table 5.7)

Table 5.7 *Average numbers of metaphors in multi-metaphor MFEs*

Discourse event	Average no. of metaphors per MFE
Class work	3.0
Geology	4.2
Maths 1	3.3
Maths 2	3.3
Apost	4.4
Dance	2.9
Overall average	3.5

- ◆ This simple quantitative result suggests that clustering is an important characteristic of metaphors in interaction, which can be further investigated for its impact on joint construction of the discourse and of the development of shared understanding.

Analysis of metaphors within their MFEs, as described in 5.12.1, reveals both static patterns of clustering, positioning and marking, and dynamic patterns of the use of inter-

related metaphorical and non-metaphorical language. The patterns produce in interaction two effects that may be important for risk-management in discourse: the first, is to signal the approach and use of metaphor, thus perhaps avoiding the risk of literal interpretation and activating extra processing capacity. The second, overlapping, effect is to build into the discourse surrounding metaphor assistance to reaching a shared understanding. These effects are discussed in more detail in the next chapter. In the next sections, I report results on the linking of metaphors within Episodes.

5.12.4 Repetition of metaphor within episodes

Analysis of the 83 episodes showed 34 instances of exact repetition of the Vehicle term(s) of a metaphor. As McCarthy (1988) points out, repetition of lexis is very common in conversation (Tannen 1989 makes the same point), and has a range of possible functions, such as emphasis.

Of the 34 instances of repetition across the data, 26 were repetitions by the initial speaker and 8 by another speaker. These 8 are of interest because they include the major use of metaphor by pupils in my recordings: when a pupil reacts to a teacher's or other pupil's metaphor by repeating it, often in an undertone, as when Ellen in line 3 of Extract 8, below, repeats the teacher's word *earwigged*. In these cases of pupils repeating metaphor terms, there seems to be some semantic or phonological impact made by the metaphor that generates its repetition. We can also note that conventional idioms in the data, e.g. *stick to your guns*, are never repeated.

Extract 8 Repetition by pupil of teacher's linguistic metaphor

CLASS WORK

- 1 T1: I hope all the conversation (.) is (.) all about your friend helping you with something
to do with your Humphrey Head work (.) having **earwigged** a little bit (.) =
- 3 E: *whispers* [**earwigged**
- T1: = to what is being said (.) I don't think (.) that's what's happening (.) I think some
people are having a good old gossip (.) am I right? (.) Peter looks guilty (.)

(cwt1 - Tape 1: 688-692)

The 8 also include three instances when the teacher picks up a Vehicle term used by a pupil and uses it herself, giving explicit or implicit feedback as to its appropriacy. In other words, repetition across speakers occurs during negotiation of metaphors and metaphor meaning between participants in the discourse.

There were only a few examples of the metaphor being repeated within episodes in ellipted or reduced form (contra Goatly's findings for written text, 1997:256), but many more examples (23 instances across 83 MFEs) of repetition with slight changes: in morphology (person, number, tense), by change of word class or addition of an adjective. Table 5.8 below shows some examples of these:

Table 5.8 *Metaphors repeated with small changes*

first use of metaphor	second use of metaphor
in <u>my</u> head	in <u>your</u> head
<u>going</u> in five threes	<u>going up</u> in threes - <u>went up</u> in threes
ring a bell in <u>your</u> mind	see if any bells ring in <u>your</u> mind
make a mental note	make a little mental note
shortening	shortened
look like a lollipop	lollipop trees..
the secret to this skipping thing	the secret of this skipping thing

Four of these again involve repetition across participants, with the teacher adjusting a pupil's utterance.

- ◆ Combining these two types of very close repetition, produces a potentially significant mechanism at work in many episodes (57 instances in 83 MFEs), where the interaction provides more than one opportunity to hear the same metaphor in slightly different linguistic contexts. It is hypothesised that this assists the processing of metaphor.

5.12.5 Relexicalisation of metaphor within episodes

Relexicalisation - the use of a different metaphor Vehicle to refer to the same Topic - occurs mostly when specific concepts are being explained through metaphor. 12 cases were found in the 83 multiple-metaphor MFEs used as the database. For example, in this extract from the Assembly several reformulations of metaphors for the same Topic concept cluster together:

Extract 9 **Relexicalised metaphor from the Assembly**

1	T3: put your hands together and we'll say a little prayer (7.0) dear lord (.) let us give thanks for the miracle of spring (2.0) to the beauty of spring flowers (1.0) and their many colours (1.0)	
5	for the wakening of the earth after its winter sleep (1.0) and for the growth of new life everywhere (2.0) we thank you god (.) amen	
	Ps: amen	(Assembly - Tape 2: 122-127)

In the next extract, the teacher is explaining to the class the derivation of a person's name from a place name and uses two different metaphorical ways of presenting the same idea:

Extract 10 *Relexicalised metaphor from Class Work*

1 T: for people who are writing about Skidda (.)
 um (.) remember it actually comes from the word skiddaw which is a hill (.) but (.)
 he's been named after it (.) but (.)
 it's been ???? you drop the W and it's skidda (.)
 5 and it's a sort of nickname (.)
 a sort of corruption of Skiddaw (.)
 that's lovely (.) that's really really nice ... Kevin
(cwt1 - Tape 1: 781-784)

Other examples in Table 5.9 show that such relexicalisation works with verbs as well as with noun metaphors:

Table 5.9 *Relexicalisation of various syntactic forms of metaphor*

first use metaphor Vehicle	second metaphor Vehicle
sticky treacle	runny butter
I see	I'm with you
take a second	think
look this way	all your eyes looking at me

5.12.6 Contrast in metaphors within episodes

Apart from using the negative form of a metaphorically used verb to express a contrast, 10 instances were found of the metaphorical use of lexical items with contrasting meanings in one episode, to present an idea and its contrast. In the dancing lesson, the teacher explains through two contrasting metaphors how the feet should be placed with only a small angle between them, referred to metaphorically in terms of the hands of a clock (line 7), and not wide apart, for which a comparison with Charlie Chaplin is used (line 10):

Extract 11 *Contrasting metaphors from Dance Lesson*

1 T1: David (.) boys (.) can you try and have your feet in what's called (.)
 first position (.)
 where your heels are just touching (1.0)
 and your knees are straight (3.0)
 5 and your toes are a little bit out (.)
 but not that much (2.0)
 about at (.) five to one (.)
 not like this (.)
 it looks funny (3.0)
 10 like Charlie Chaplin
 Ps: laugh (Dance - Tape 5: 67-71)

Other examples are *shortening .. the long form* (Apostrophe lesson) and *hold it ..off you go* (Dance lesson).

It may be that, once one metaphor is used, there is an increased possibility that, if a contrasting idea is to be expressed, this will also be done metaphorically. However, any testing of such a hypothesis requires a larger corpus.

5.12.7 Connection between metaphors within episodes

A total of 15 instances occurred of linked but different Vehicle terms being used in the same Episode.

Thematically linked metaphor Vehicles within episodes

Within Metaphor Framing Episodes, there is some evidence of local systematicity, in which thematically linked Topic~Vehicle combinations appear, not just relexicalising one idea with a different Vehicle, but building on one metaphor with another slight different, but linked one. This is of interest since this is where some evidence of the local use of conceptual metaphor (Lakoff and Johnson 1980) might appear. This phenomenon occurred 8 times in the data. In Extract 5, we saw how two sets of terms from the Vehicle domain of travelling are used to talk about two aspects of the process of writing diaries about a school trip.

Parallelism and Parapraxis in Vehicle linking

As well as the use of metaphor Vehicle~Topic combinations that link thematically, there are two other, less frequent, ways in which Vehicles in the MFEs link - through parallelism of form and / or meaning; and through apparently coincidental links or "serendipitous Freudian slips" (Dennett 1991:243) that are sparked off from processing, and which, after Freud (1901/ 1975), I have called parapraxis.

Examples of parallelism:

off her own bat ... off you go	(Maths lesson)
(writing) goes on ... time's gone on	(Class work)

Example of parapraxis:

Extract 12 Parapraxis in the Dance Lesson

1	right now (.) double plaiting (2.0) Ellen and Rebecca (1.0) you must hold hands ????
	if you want to lock your arms inside each other (.) that's fine (.) but hold hands (4.0) that's it (.)
5	right (.) because (.) the key is (.) to keep these shoulders (.) together (.) if you can
	(Dance - Tape 4: 142 - 144)

Parallelism and parapaxis in metaphor use would seem to be generated by interesting but basically non-central processing effects. Thematic linking of Vehicle terms can play a much more significant role in supporting the understanding of metaphorically-encoded ideas through the gradual development of understanding. The local, within-episode, effect is complemented by the more global systematicity in Vehicle use observed across Episodes and across discourse events.

A much more direct support to understanding is provided in Episodes through the use of non-metaphorical language to develop ideas talked about metaphorically, and this is discussed in the next section.

5.13 Links between metaphorical and non-metaphorical language within episodes

As already stated, the work of "sense increment (gloss, expansion, redefinition, intensification)" (McCarthy 1988:188) and of movement to superordinate level seems to be carried out in MFEs by non-metaphorical language. Moreover, a significant amount of such work is often done by the producer of the metaphorical language, and this again emphasises that the use of metaphor in discourse is often well supported and, in practice, a receiver is not often left to struggle to resolve a Topic-Vehicle incongruity unaided. For educational discourse, it may be important to examine the types of support for meaning that accompany metaphor and how helpful they appear to be to receivers.

5.13.1 Close analysis of one episode

Many examples are available in the data, but I have selected the "lollipop trees" episode from the Class Work data to quote in full and use to exemplify the different kinds of meaning development:

In this extract, the teacher makes use of the linguistic metaphor "lollipop trees" to help a child solve the problem of how to draw realistic-looking trees. We can note first that the metaphor is used three times by the teacher in slightly different forms, and repeated later, to herself, by Louise who has been eavesdropping on the conversation. However, when we look more closely at how the metaphor is placed in the discourse, we can see how it emerges from the discourse around drawing trees, and once produced, is available to serve as a kind of shared shorthand reference for participants.

Extract 13 The "Lollipop trees" Episode

CLASS WORK (TEACHER T1) EPISODE 5

- 1 T: as long as you don't start day two until ???? I think that (.) what is that bit? (1.0)
now I think that's the trees (1.0)
you've got (.) you've got a **visual memory** of what you saw at Humphrey Head (.)
now to actually get your trees right (.)???? what do you have to do? (1.0)
- 5 look out of the window at THESE trees (1.0)
let's look at THESE trees to see (.) how the branches and the twigs grow out of the tree (1.0)
and then go back to your MEMOry (1.0)
of the tree that you're trying to draw (.) because that's tended to (2.0)
to look like a lollipop hasn't it (3.0)
- 10 now if it was that shape (.) then say so (.) because I remember (.)
when I (.) when I was a very young teacher and I kept on saying to a little girl (.)
will you PLEASE stop doing lollipop trees (2.0)
and then I went to visit her home (2.0)
and all along the street where she lived (.) they had pollarded (.) the trees (.)
- 15 chopped all the branches off (.)
and the trees all looked like (.) little lollipops (1.0)
so she was actually quite right to draw them like that (.)
so if it WAS actually like that (.)
then you have to stick to your guns and say that's how it was (1.0)
- 20 I don't remember seeing one quite like that (1.0) not quite (.)
and I think you need to look (.)
and see (.) how the branches are attached on to the trees (.)
DON'T rub it out (2.0)
(to P2) ???? why was that? ???? was that going down on to the beach (.)
- 25 yes that's super (2.0) and (1.0) you've only got one tree so far (.)
I think there was more than one (.)
see how you can do (.) it's lovely that one (.) don't spoil it (.)
the only thing that I'm going to criticise (.) is (1.0)
- L: (to herself) [lollipop trees

(cwT1 - tape 1: 622-641)

Before the first use of the metaphorical comparison in line 9, the teacher has presented the sensory nature of the problem - *visual* (line 3), and the problem itself - the trees are not *right*. The Topic of the *lollipop trees* metaphor, the shape, is thus being developed in advance of the use of the Vehicle term. The teacher continues with Topic development in presenting a contextualised solution to the problem - *look out of the window*.. and in including a description of the precise locus of the problem - *how the branches and twigs grow out of the tree* (line 6). She then reiterates the nature of the problem, pulling all these together as *that's tended to look like a lollipop* (line 9). The metaphor appears to serve ideationally and interactionally as a summary of the key points. That the teacher has also chosen an, interpersonally, appropriately memorable way of metaphorically summarising the point, is suggested by Louise's spontaneous re-use of *lollipop trees* later on (line 29). The choice of Vehicle serves to emphasise the point, and may also represent

an attempt by the teacher to align herself with the child through the non-threatening choice of *lollipop*.

In line 10, the Vehicle term *lollipop* is elaborated through *if it was that shape*. This serves to narrow down the possible attributes of *lollipops* that might be transferable to *trees*, and should help with keeping shared understanding clear.

The extract continues with a short anecdote (lines 11-17), the moral of which is summarised by *stick to your guns* (line 19). In this anecdote, the metaphor *lollipop trees* is used, contracting the metaphorical comparison, which is then expanded again to *looked like little lollipops* in line 16. The discussion of the problem then returns to the classroom situation, and comes to a close in line 22 with a less metaphorical restatement that returns to the Topic *how the branches are attached on to the trees*.

The teacher's lexis moves between the general (*visual*) and the specific (*how ..branches.. attached*) via the use of a metaphor. The receiver of the metaphor is prepared for its interpretation before hearing it, is assisted by repetition, and is further helped by non-metaphorical restatement of the elaboration.

In the data, discourse around metaphors used ideationally regularly demonstrates these patterns of non-metaphorical language used:

- to develop the Topic and Vehicle domains through expansion, elaboration and exemplification
- to contextualise the Vehicle by relating to life outside the discourse event
- to summarise and restate the link between Topic and Vehicle.

Every episode in the Geology lesson, including single metaphor episodes, contained one or more of the Vehicle development mechanisms of elaboration, exemplification or expansion, along with occurrences of the metaphorical repetition and reiteration described earlier. Furthermore, as we will see in Chapter 7, these discourse patterns are replicated in Think Aloud protocols of readers working on text containing metaphor (also Steen 1994).

I hypothesise from this regular patterning that instances in which such development does not happen then take on some significance. Possible examples of this were found in the Maths lesson and Apostrophe lesson data, and there seems some probability that the rare occurrence of unexplicated metaphor may result from the teacher's own lack of confidence with the concepts, and that potentially, it may lead to problems for pupils' comprehension.

- ◆ Given the regularity of development and explication, even of quite straightforward metaphors, use of un-explicated metaphor is likely to be significant.

5.13.2 Metaphorical and non-metaphorical language within MFEs: summary

Characteristic features of the interplay between metaphorical and non-metaphorical language can be summarised as in Table 5.10 :

Table 5.10 *The interplay of metaphorical and non-metaphorical language within Metaphor Framing Episodes*

<p>A. Metaphors within episodes can be connected through</p> <ol style="list-style-type: none"> 1. Repetition: exact or close 2. Relexicalisation: a further metaphor expressing the same sense 3. Contrast: a metaphor expressing an opposing sense 4. Connection: Thematic linking; parallelism; parapraxis <p>B. Non-metaphorical language develops metaphor within episodes through</p> <ol style="list-style-type: none"> 1. Expansion of the sense of the metaphor through more specific detail 2. Exemplification of the metaphor 3. Elaboration of the metaphor through additional detail or through more general terms 4. Contextualisation of the metaphor through reference to everyday life of participants

These findings complement the results in Section 5.10 that showed which kinds of teaching goals are most likely to feature Metaphor Framing Episodes. Metaphor is used in classroom discourse more often for certain teaching goals than for others, and when it is used is likely to be repeated, relexicalised metaphorically and / or explicated non-metaphorically within closely occurring turns of talk.

A child's experience of metaphor in interaction thus includes exposure to these intricate patterns of talk which mediate the interpretation of metaphorical language, and the concepts that the metaphor is used to talk about.

5.14 Responses to metaphor in the classroom discourse data

Although not many explicit responses to metaphor were captured in the recordings, the ones that were made demonstrate that the pupils are alert to the potential incongruity and creativity even of prosaic metaphors. The most frequent type of response found in the data is a straightforward repetition of a word or phrase, usually striking phonologically

(see 5.12.4 above), used metaphorically by the teacher or another pupil. This happened in 5 instances.

Metaphors were extended for humour in two ways:

(1) - by picking up the Vehicle term and making it literal, as in Extract 14:

Extract 14 *Pupil response to metaphor in Class Work*

T: we've got to think of a hymn (.) about (2.0) **the good shepherd** (2.0) **the Lord's my shepherd** (.) do you? (.) I don't know whether you could manage the Lord's my shepherd (.) could you? (.) it's quite difficult (.) for the breathing

....

H: (to friends) **baa baa black sheep**

(cw T1-Tape: 6 - 22-38)

or

(2) - by extending the teacher's metaphor in a response, as in Extract 15. The teacher in this extract poses a metaphorical question, without any apparent expectation of a response, but which is answered later by a pupil :

Extract 15 *Pupil extension of teacher's metaphor*

L: (*whispers*) I'm having trouble with this

T2: **where does the time go?** (2.0) finished?

L: (*to T2*) I'm having trouble with this

T2: you stuck? (.) right (.) ...

after several minutes of other talk

.. yes Steven?

St: I know **where the time goes** (1.0) into the past

T2: **into the past** (.) you're right ?????
quickly into the past

(Apost - Tape 3: 367 - 387)

In the final type of pupil response, which occurred only once in the data, a pupil negotiates the ideational content of the teacher's metaphors by offering an alternative metaphor:

is molten lava like wax? (Geol - Tape 5: 376)

5.15 Conclusion

In the concluding section, I draw together the key results from the analysis of metaphor in classroom discourse data in terms of the research questions for this investigation.

1. What is the frequency of occurrence of metaphorical language in different educational discourse contexts?

- ◆ A total of 406 linguistic metaphors occur in the 28,285 words, giving a frequency of 1 metaphor per 70 words or 14 metaphors per 1000 words.
- ◆ There is statistical evidence of a significant departure from equal occurrence of metaphors in the different discourse events.
- ◆ The average metaphor density across the nine discourse events is 15 linguistic metaphors per 1000 words.

2. What type of metaphorical language do children encounter in classroom discourse?

level of metaphor units

grammatical form

lexical and ideational content

- ◆ Prosaic metaphor in classroom discourse has the following typical features:
 - ◆ it is likely to have a multi-word Vehicle unit
 - ◆ it uses Vehicle terms of high indexical valency
 - ◆ it uses verbs as metaphor Vehicles, often phrasal or prepositional verbs
 - ◆ if striking, is probably idiomatic.
- ◆ Simple grammatical analysis of metaphors showed a consistently high level of verb metaphors of all lengths, nearly 3 times as many as nominal metaphors, and 9 times as many as Adjective or Preposition metaphors.
- ◆ The Type/Token ratio results suggest that Vehicle lexemes are often repeated at least once in a discourse event, and often more than twice; this repetition may be important for interaction and understanding.

- ♦ A negative correlation between frequency and type / token ratio is found, i.e. use of largely distinct metaphors tends to accompany limited use of metaphors, and conversely a large degree of repetition of metaphor types tends to accompany high frequency of metaphor use.

3. How is metaphorical language used in on-going classroom interaction?

in relation to other Topic- Vehicle combinations

in relation to non-metaphorical language

in relation to teaching goals

- ♦ Although different educational discourse events gave rise to different groupings of Teaching Sequences, there is a consistency across events in the use of metaphor within Teaching Sequence types, and considerable variation in the use of metaphor across Teaching Sequence types
- ♦ The clustering of figures for the number of metaphors in Metaphor Framing Episodes around the mean suggests that metaphors are grouped together in twos or threes in classroom discourse.
- ♦ The evidence of repetition and relexicalisation of metaphors within episodes suggests a potentially significant mechanism at work, where the interaction provides more than one opportunity to hear the same metaphor in slightly different linguistic contexts.
- ♦ Most metaphors have their meaning developed through expansion, elaboration or exemplification in non-metaphorical language within their episodes.
- ♦ Given the regularity of explication, even of quite straightforward metaphors, within their episodes lack of explication can be suggestive of a teacher's own lack of confidence with concepts, and that potentially, use of un-explicated metaphor may contribute problems for pupils' comprehension.
- ♦ Individuals may choose and use prosaic metaphor in distinct ways, with interpersonal use reflecting their attitudes and values.

4. What ideational, interpersonal and interactional impact does the metaphorical use of language have in classroom discourse contexts?

- ◆ Interactionally, metaphor is often used to negotiate with participants the course and content of activity.
- ◆ Ideationally, metaphor is used in a range of ways to mediate the cognitive demand of curriculum content.
- ◆ Ideational uses of metaphor appear to often result in a downwards shift in cognitive level of the discourse.
- ◆ The interpersonal impact of metaphor is most clearly demonstrated in Feedback and Control sequences, but is also evident in other types of sequence. Interpersonal impact is effected through the mitigation of potentially threatening cognitive demand, by encouraging engagement with classroom activity, and through distancing or alignment between discourse participants.
- ◆ Metaphors used interpersonally varies considerably with the preferred style of the teacher. Pupils may thus receive different, perhaps conflicting, messages about attitudes and values in classroom discourse.
- ◆ Pupil responses to metaphorical language indicate an awareness of the creative potential of the incongruity of linguistic metaphors

CHAPTER 6

METAPHOR IN CLASSROOM DISCOURSE: DISCUSSION OF RESULTS OF INVESTIGATION 1

6.1 Introduction

The findings reported in the previous chapter are the outcomes of multi-level and cross-level analyses of classroom discourse that attempt to unravel the complexity of prosaic metaphor. In this chapter, I bring together potentially important findings to discuss implications for a theory of prosaic metaphor.

I first refine and complete the theoretical framework set up to describe prosaic metaphor in discourse through necessary, graded and typical conditions. I then review evidence of variation and consistency in metaphor use, and suggest that discourse processing demands can be drawn on to explain this evidence. A key finding about metaphor in interactional use has been information about consistency in patterns of positioning and formulation of linguistic metaphors within Metaphor Framing Episodes. I bring this together and interpret it in terms of how the use of prosaic metaphor is signalled, and how understanding of metaphor is supported in interaction. This leads me to re-assess the idea that metaphor in discourse presents a risk to understanding.

I return to complex systems theory to provide a model for the use of prosaic metaphor in interactional language use, using examples of boundary decisions made in identifying the category 'prosaic linguistic metaphor' to justify my claim that metaphor is often not a special use of language but, rather, an outcome of using language resources for particular goals in particular discourse contexts. Finally, I revisit the issue of continuity between poetic and prosaic metaphor.

6.2 A theoretical framework for prosaic metaphor

The dimensions of a theoretical framework established for metaphor in spoken interactive discourse by this study are summarised in Table 6.1:

Table 6.1 Dimensions of a theoretical framework for prosaic metaphor in spoken discourse

<p>Units of Analysis the Linguistic Metaphor set within the Metaphor Framing Episode mapped on to Teaching Sequences and set within the Discourse Event</p> <p>Identification and Descriptive Criteria Necessary Conditions Typical Conditions Graded Conditions Boundary Decisions</p> <p>Method of Analysis Cross-level analysis of goals of discourse participants of the functions of a linguistic metaphor within its episode of metaphor in interaction of linguistic form</p>

I now complete the tasks of describing typicality for prosaic metaphor and of checking the graded conditions set up in Chapter 3, and adjusting them to take account of what has been found in the data.

6.2.1 Typicality and prosaic metaphor

Returning to the question of what is a 'typical' prosaic metaphor, the results of the empirical study are used to delineate the nature of the 'typical' metaphor in spoken interactive classroom discourse, and then to address the issue of the source of the difference between this and the 'typical' poetic metaphor, as assumed in theoretical discussions in the literature.

As seen in Chapters 1, 2 and 3, writers on metaphor appear to make assumptions about typical metaphors through those that they select to work with as exemplars or 'best examples' (Lakoff 1987). Typicality seems usually to coincide with recognisability - a stretch of language most easily recognised as a metaphor is labelled a 'typical' metaphor. This criterion may partly coincide with frequency of occurrence, but from what is known of human mental processing, frequency by itself is a poor marker of (proto)typicality

(Lakoff 1987). Members of the 'metaphor community' will, inevitably, bring very different skills and knowledge to bear on the task of recognising metaphor from 'the person in the street'. I cannot, from the empirical work carried out, offer a description of a typical prosaic metaphor from the point of view of the average 10 year old. The best I am able to do at this point is to extrapolate from the results of the analysis of the corpus of interactional data as carried out in the first investigation towards possible candidates for typical prosaic metaphors. For spoken, interactive, classroom data the typical prosaic metaphor, as identified for this study, appears to have features as displayed in Table 6.2:

Table 6.2 Candidate features of a typical prosaic metaphor

<i>Grammatical form of metaphor Vehicle</i>	The typical prosaic metaphor Vehicle is verbal, and most likely to use a phrasal or prepositional verb
<i>Level of Vehicle unit</i>	The typical prosaic metaphor Vehicle is a multi word unit.
<i>Clustering of metaphor</i>	The typical prosaic metaphor is grouped within the discourse close to relexicalisations or repetitions of the same metaphor.
<i>Systematicity</i>	A typical prosaic metaphor will be (weakly) systematically related to others in the same discourse event.
<i>Impact</i>	The typical prosaic metaphor appears to have a primary impact, interpersonal, interactional or ideational, that relates to the goals of the discourse at that point.
<i>Explication</i>	The meaning of a typical prosaic metaphor is supported when it is produced, often through non-metaphorical language.
<i>Novelty</i>	The typical prosaic metaphor is not novel, creative or striking; if there is a strong contrast between Topic and Vehicle, this is likely to be conventionalised, at least within the discourse community of the school and class.

An exemplar typical prosaic metaphor would have to be something like:

let's go back to these rocks (Geology - Tape 5: 351)

It seems likely that such patterns of typicality would be found in the interactive discourse of other groups beyond the world of education, since, as will be discussed later in this chapter, they seem to result partly from the processing demands of interaction, as well as from the content and goals of the talk.

Table 6.2 can now be contrasted with Table 6.3 which lists features of typical 'metaphor as device' (M-D) metaphors, as extracted from the literature in Chapter 3:

Table 6.3 Features of a typical M-D metaphor

Typical conditions	
T1	The Topic term is stated explicitly, or is visible to both producer and receiver
T2	The form is not negative
T3	The Vehicle domain is familiar to both producer and receiver
T4	The producer intends the utterance to be interpreted metaphorically
T5	The high level of incongruity between Topic and Vehicle makes it likely that the receiver will interpret the stretch of language metaphorically
T6	Of syntactic form : <i>A is B</i>

Common to both sets would be T2, and T3. The two sets of typicality features differ as regards:

- form
- degree of incongruity / novelty
- intention
- explication
- clustering

Explication and clustering arise from the nature of oral interaction, whereas form, incongruity and intention lie very close to the heart of definitions of poetic / prosaic metaphor. If the typicality features produced in the one case from M-D theory and in the other from discourse data differ so dramatically, then the case for an independent theory of prosaic metaphor in use is further strengthened.

6.2.2 Graded conditions for prosaic metaphor

The original list of graded conditions was established at theory-level (Figure 3.4), and the task now is to review empirical results in order to produce a set of graded features that work at conceptual-processing level, and that produce congruence between these levels. The list of theoretical graded features was as follows:

Table 6.4 Graded conditions for metaphor

Graded conditions	
G1	The degree of incongruity between Topic and Vehicle
G2	Novelty / Conventionality of Topic-Vehicle link
	G2-1 Idiomaticity
	G2-2 Vitality
G3	Paraphraseability / inexpressibility
G4	Cognitive demand of Topic and Vehicle terms and domains
G5	Familiarity of Vehicle domain to producer and/or receiver
G6	Familiarity of Topic domain to producer and/or receiver
G7	Explicitness of metaphor intention
G8	Connotative power of the Vehicle term
G9	Systematicity: local, discourse or global

As predicted, G2, G5, and G6 proved straightforward to apply for particular contexts and discourse participants, and useful in analysis.

G1 Degree of incongruity / distance

In theoretical debates the concept of 'distance' between the Topic and Vehicle domains has been debated without much progress being made, often ending up grounded on fundamental issues such as the nature or existence of similarity as a psychological reality (e.g. Rips 1989) or, as in this thesis, the identification of domain boundaries. Attempts to apply this feature to interactional data have produced further difficulties at a theoretical level, although as we saw in Section 5.14 of Chapter 5, it is possible to demonstrate empirically that some T-V anomalies are noticed by receivers of a metaphor. If theory-level analysis is to be congruent with processing-level analysis and findings, then the notion of incongruity must itself be contextualised.

The distinction between what may be identified theoretically as incongruous, and what empirically appears to participants to be anomalous can be seen most obviously in the use of idioms. Theoretical analysis of the data for Topic-Vehicle domain incongruity would result in idioms such as *keep the kettle boiling* or *come up trumps* being categorised as having highly incongruous T and V domains. However, there is usually no reaction to them from the receivers, suggesting that they are not heard as highly anomalous.

Analysis of prosaic metaphor shows that incongruity is to some extent context-dependent and relative to the expectations of discourse participants and their shared contextual knowledge. For example, the teacher in the Geology lesson exemplifies the idea of 'classification' by physically placing the children in groups and commenting:

then we've got another classification (1.0) they're still human (.) so we can put them in a big circle that says human (.) but we can also put them in two smaller circles (.) that says (1.0) male female

(Geology - Tape 5: 237-240)

Outside the particular school context, the use of *put them in a big circle/ two smaller circles* to refer to classifying and sub-categorising might seem to make use of a Vehicle domain (big and small circles) that is highly incongruous with the Topic domain. The phrase-internal metaphor Vehicle *says* to refer to the Topic domain of labelling or naming a category also draws on a fairly remote domain when viewed out of context. However, interpretation within the specific context requires pupils to recall previous shared activity in which they have probably categorised objects by physically placing

them inside plastic hoops that represent set boundaries, and labelled them both orally (says) and in writing. For the pupils and teacher *circles / says* do not come from remote domains but from recent shared experience, so that the incongruity is not enormous.

The converse of this context-dependence of incongruity may well operate too, with lack of shared knowledge leading to perceptions of incongruity different from that intended by the producer of a metaphor. The teacher or text book writer may select a Vehicle term in the expectation that it would not be so incongruous as to cause comprehension problems or in the expectation that the incongruity would lead to the creation of a poetic image for the receiver. The receivers, however, with their more limited knowledge of the world, may find the Vehicle more incongruous than intended, or incongruous in a different way. Thus the child who picked up the teacher's *where does the time go?* and replied *I know where the time goes... into the past* (Apost - Tape 3: 367-386) noticed the incongruity between the Vehicle domain of place and motion, and the Topic domain of time. It is doubtful that the teacher intended the original question to be strikingly anomalous rather than simply idiomatic.

Interactionally, discourse participants appear to make use of variation in incongruity in the explication of ideas through metaphor. For example, in the Geology lesson MFE around the Topic of the nature of volcanic lava, the Vehicle terms employed for the same Topic domain seem to shift along a cline of decreasing incongruity/anomaly:

sticky treacle - runny butter - wax (Geology lesson 5: 374-376)

Incongruity in prosaic metaphor is thus graded, and is dependent on both context and on background knowledge.

G3 Paraphraseability

Searle comments on paraphraseability that, at a trivial level, it can be seen as either completely impossible or always possible (Searle 1993:109), and that the essence of paraphraseability lies in the accessibility to participants of the extra understanding that results in the use of a particular metaphor. In other words, paraphraseability is also context-dependent.

Even the most delexicalised Vehicle term allows for degrees of open-ended interpretation, and the idea of "richness"/ resonance, originally applied to deliberate poetic metaphors (Black 1979; Siltanen 1991) can be applied to prosaic metaphor too.

The data showed clearly that the ideational content of much prosaic metaphor is explicated in the interaction around the metaphor (Chapter 5, Section 5.13). The other extra content conveyed by metaphor lies in the connotative power (G8) and in the interpersonal function of metaphor, which was seen particularly clearly in Feedback and Control sequences in the data (Chapter 5, Section 5.10.4). Three dimensions of interpersonal content adapted from Graumann (1990) have been shown to be useful in analysis, adequate and gradable:

(1) positive – negative evaluation

This is operationalised in the choice of lexical item and in frequency of systematic use of particular Vehicle items:

I think you all deserve a medal (Dance - Tape 5: 91)

who could really use their head and think hard....the people who just looked at the questions and didn't think too much at all (Maths T2 - Tape 2: 12)

(2) alignment --distancing

The alignment function was seen in metaphorical language that involved the use of humour and use of 1st person pronouns. Degrees of formality could also be seen as contributing to alignment / distancing.

my brain can't manage that (Maths T1 - Tape 6: 98)

(3) emphasising – de-emphasising

This was done through pre- and post-modification

make a little mental note (Apost - Tape 3: 5)

and through the choice of Vehicle lexical item relative to participants' expectations

rock ... becomes like sticky treacle (Geol - Tape 5: 364)

G3 is then replaced with the three graded features which form a cluster relating to

G' 3 Attitudinal Impact

G'3-1 positive -- negative evaluation

G'3-2 alignment --distancing

G'3-3 emphasising -- de-emphasising

with the claim that these can be construed at both a theoretical and a processing level, that there can be congruence between the construals of them at the two levels, and that between them they take some account of paraphraseability. Other aspects of paraphraseability may be taken account of G8 Connotative Power and by the degree of explication metaphors receive when used.

The results of the first investigation have demonstrated quite clearly that the comprehension demands of metaphors are usually supported by explication in the talk surrounding the metaphor, which paraphrases the metaphor in close discourse proximity of use. Analysis of the discourse data suggests that, while explication is normal practice, the nature and type of explication is affected by both how a producer perceives the needs of receiver, and by the ability of producer to actually perform the explication task. In the case of some mathematical metaphors, it would seem that lack of confidence on the part of the producer to actually perform the explication task can deprive receivers of useful extra information. Gradedness has thus been found in the extent and nature of explication and in the explicability of specific metaphors for specific discourse participants. "Explication" is thus suggested as an additional graded feature, that can be operationalised both theoretically and empirically.

G'4 Explication

G4 Cognitive demand

The cognitive demand of a metaphor for receivers arises from choice of both Topic and Vehicle. Investigation of how metaphor is used in Instructional Sequences has shown that the cognitive demand of metaphor Topics varies along dimensions of familiarity, abstraction, generality and complexity. The same dimensions can be applied to Vehicle terms and concepts, and to the two combined in a particular metaphor. So religious metaphors such as *the Lord is my Shepherd* may have Topics that are more cognitively demanding than their Vehicles, whereas a metaphorical idiom such as *keep the kettle boiling* may combine relatively unchallenging Topic and Vehicle.

Familiarity has already been separated out as a graded condition. The other three dimensions can apply at both theoretical and processing levels and so are added into the framework as a cluster relating to the broader notion of cognitive demand (re-numbered as G'6)

G'6-1 **abstraction** of Topic, Vehicle and combination

G'6-2 **generality** of Topic, Vehicle and combination

G'6-3 **complexity** of Topic, Vehicle and combination

The original features G5 and 6 are retained, but combined as G'5.

G7 Explicitness of metaphorical intention

At the theory-level this feature related to the signalling of metaphorical similes by the words *like, as* etc, and the signalling of metaphor explicitly with a marker such as "*metaphorically*". In the empirical data there were no occurrences of this latter signal

although, interestingly, the converse was found when literal, core uses of a verb were marked with *actually*, as in

you can actually see the new structure (Geology - Tape 5: 341)

This might suggest that non-literal interpretations were subconsciously perceived as more likely.

Candidates for less explicit signals of metaphoricity include the positioning of metaphor Vehicles consistently in rheme position in the clause, and pausing. This graded condition can be maintained since it can function both theoretically and at a processing level. The empirical investigation has added to understanding of how metaphorical intention is made explicit.

G9 Systematicity

Both local and global systematicity were found in varying degrees in the interactional data, confirming that this feature is graded and works at both theoretical and processing levels. The further level of systematicity to be added operates at the level of the particular discourse community, as when verbs of *saying*, *telling*, *hearing* etc are used to talk about reading and writing.

The revised set of graded conditions is laid out in Table 6.5.

This revised set of graded features of metaphorically used language can operate together with the necessary and typical conditions to describe linguistic metaphor in discourse data in a subtle and detailed way, allowing for example, exploration of how different types of metaphor are combined in interactional sequences to ensure shared understanding of ideational and interpersonal content. They operate in relation to discourse context and participants, thus allowing contextualised analyses of data, and they are congruent across levels of theory and conceptual-processing.

Table 6.5 Revised list of graded conditions for metaphor

G1	Incongruity
G2	Novelty / Conventionality of Topic-Vehicle link
	2-1 Idiomaticity
	2-2 Vitality
G3	Attitudinal Impact
	3-1 Positive - negative evaluative effect
	3-2 Alignment -distancing effect
	3-2 Emphatic effect
G4	Explication
G5	Familiarity
	5-1 of Vehicle domain
	5-2 of Topic domain
G6	Cognitive demand
	6-1 Level of Abstraction of Topic and Vehicle
	6-2 Level of Generality of Topic and Vehicle
	6-3 Complexity of Topic and Vehicle
G7	Explicitness of metaphorical intention
G8	Systematicity
	8-1 Local systematicity
	8-2 Discourse community systematicity
	8-3 Global systematicity

6.3 Variation and consistency in metaphor use

Although the classroom discourse data was collected over a relatively short length of time, and covers relatively few distinct discourse events, there appears to be sufficient evidence of patterns in prosaic metaphor use to suggest significant variation at some levels of analysis, and significant non-variation at others. I first review how metaphor use has been shown to vary with discourse event, and suggest that, at event level, the nature of discourse processing demands on the teacher as participant is one of the main causes of variation in metaphor use. At the level of the Episode, however, variation disappears, to be replaced by consistency, in the use of repetition and relexicalisation, and explication through non-metaphorical language. This will be discussed in following sections.

6.3.1 Accounting for variation in metaphor use

Looking first at how the discourse events contrast with respect to metaphor use, it will be recalled that differences were found in the overall frequency of occurrence of

metaphor, in the number of different lexical types of metaphor, and in the frequency of different grammatical types of metaphor. Personal differences in style of the teachers were found to be reflected, not so much in the measures of metaphor type and density, but rather in the type of teaching sequence which metaphor was used and in lexical choice of metaphor within sequence. Differences in metaphor use appear to derive from the interaction of differences in processing demands on speakers with differences in the topics and goals of the discourse. So, in the Assembly, when the teacher told first a story of her own and then a story from a book, there was, in both cases, evidence of preparation that reduced on-line demands. Similarly, the content and worksheet for the Geology lesson had been prepared in advance and supported the teacher in her talk. This reduction of discourse processing demands was accompanied by higher metaphor type/token ratios and greater use of metaphors with a primarily ideational function. These results may have been nothing more than a side-effect of the more content-oriented topics of these lessons, that served to prompt the preparation. However, comparison with the two Maths lessons supports the hypothesised link with processing demands, in that these lessons also had a high level of ideational content, but were much less expository, and more interactive. In contrast, while the rough plan of the Maypole Dancing lesson might have been prepared, the practice was by its very nature spontaneous and presented unexpected demands on the teacher's attention. This appears to result in a higher proportion of verb and idiomatic metaphors.

- ◆ At the level of the discourse event, discourse demands, deriving from goals and situational and participant-related aspects of context, are held to directly affect the types of prosaic metaphor produced.

6.3.2 Accounting for consistency in metaphor use: introduction

At the level of the Metaphor Framing Episode, contrasts give way to similarities in metaphor use. It is my hypothesis that processing demands again can be seen as lying at the root of observable phenomena in metaphor use, and further, that when we consider not just the constraints of these demands in discourse contexts, but their interaction with the language resources and discourse goals of participants, an explanation for the phenomenon of prosaic metaphor in talk can be generated. In order to reach that point, I have to do several things. First, I present an episode from the Geology lesson, which will be used to illustrate detailed points of my argument. After preliminary consideration of the types of metaphor found in the data extract and identification of characteristics of metaphor use that derive from the classroom context, I move, in the following sections,

to demonstrate how regularities and patterns in metaphor use can be seen as providing support to discourse participants that results in sensitive management of potential communicative risk. I argue that such interactional support for metaphor in use is an important characteristic of prosaic metaphor, and needs to be part of a theory of metaphor in discourse.

6.3.3 Accounting for consistency in metaphor use: the Volcanic Lava Episode

Extract 16 is representative of Episodes containing nominal metaphors in the corpus, and shares many key features with other Episodes. Being slightly longer than many of the other episodes, it also allows most of the key characteristics of metaphor in use to be examined in one discourse context. It is taken from the middle of the geology lesson, and shows the teacher (and a pupil) using several quite vivid metaphorical similes *sticky treacle* / *runny butter* / *wax* to explain the nature of volcanic lava. It also contains, in line 1, an example of a verb metaphor *go back to* used in Agenda Setting, and two animate verb metaphor Vehicles *fire formed* / *working* used to describe actions by inanimate objects.

Extract 16 The "Volcanic Lava" Episode from the Geology Lesson

GEOLOGY LESSON EPISODE 9

1 right (.) let's go back (.) to these rocks (1.0) **fire formed** (2.0) I think you probably all know (.) how (.) igneous rock comes to be formed (2.0)???? does ???? does (2.0) you should know this (1.0) you love watching this on the telly (.)

5 and if one starts **working** again (.) it's very exciting (.) and it's on the news for days (.) in fact I have seen one **working** recently (1.0) and there's a village (.) in Italy (1.0) and they're dropping things to try and stop the village from being destroyed (3.0) yes (.) Ellen?

10 E: volcano
T: yes (.) it's a volcano (1.0) and (2.0) the rocks (.) that are formed by fire (.) the rocks that are (.) are molten (.) molten rocks (1.0)

15 just imagine rock (1.0) getting so hot (2.0) that it actually melts (1.0) so that it becomes like (.) sticky treacle

Ps: ugh
L: (*whisper*) treacle

20 T: or even (.) like (.) runny butter
Ps: ugh
T: have you ever put (.) a little dish (.) with butter in (.) into the microwave?

Ps: yes
25 T: and left it for too long?
Ps: yes
T: do you know what happens? (.) I did it at the weekend (.) so I know what happens

P: is molten lava like (.) wax?

30 T: yes (1.0) it can be a bit like **wax** (1.0) but do you know what happens to butter? (.) it does (.) there are two things it does (.) which are like (.) volcanic (.) rocks (.) when they're being ???

35 P: it bubbles
T: it bubbles (.) well done (.) yes (.) and it (.) it sort of (.) keeps doing this ???? so (.) that's where (.) these rocks come from (1.0) and (2.0) what is interesting about Cumbria (1.0)

(Tape 5: 351-384)

The stretches of language related to the Topic of volcanoes and lava that satisfy the necessary conditions for potential metaphoricality as established for this study are:

- 1. let's go back to these rocks
- 1 fire-formed
- 5 one starts working again

- 17 it (rock) becomes like **sticky treacle**
20 or even like **runny butter**
29 is molten lava like **wax**?
30 it can be a bit like **wax**

The three nominal metaphors are reasonably high in incongruity between Topic and Vehicle (G1), are not conventional (G2), may generate an alignment effect through using familiar household substances (G3-2, G5-1), and are fairly low in cognitive demand (G6) since the Vehicle terms refer to specific, concrete and simple concepts. The Topic *volcanic lava* will be familiar to the children, at least through television pictures. The metaphors can thus be assumed to present not very heavy processing demands for the discourse participants.

Discourse features in the extract that are characteristic of classroom talk appear to derive from one underlying fact: the dominant role of the teacher in initiating and guiding the talk. This results in the "guess the topic" sequence at the beginning of the extract, where from lines 1-10 the teacher is encouraging the pupils to guess that fire-formed rocks can come from volcanic activity. Having selected the topic of this episode, the teacher also controls its development, through the idea of molten rocks, to how they behave. This is carried out in one instance through the asking of a pseudo-question (lines 34), the response *it bubbles* (35) and the repetition of and feedback on the response, *well done* (36), producing the familiar IRF pattern (Sinclair and Coulthard 1975). The first two occurrences *fire-formed* and *working* are included as metaphorical because they use animate verbs to talk about inanimate processes, and animacy appears to be particularly characteristic of educational metaphor.

Consistency in interactional features around the use of linguistic prosaic metaphor at the level of the Episode will now be discussed by drawing these together in two clusters: one relating to how metaphor is signalled, and the other to how the understanding of metaphor is supported.

6.3.4 Signalling the use of metaphor in discourse

A speaker uses a variety of ways to signal or mark the approach and use of metaphorical language in interaction, which I now summarise and illustrate from Extract 16:

(1) Contrast between Vehicle and Topic as signal

Metaphor involves, by definition, the incongruous use of a lexical item, with the incongruity relative not only to content, but also to context. In an MFE, two levels of

context, the framing episode and the immediate linguistic frame, serve to foreground incongruity. While instances of pre-modification of a Vehicle term by items from the Topic domain did occur (and are discussed 6.3.5 below), this was not very frequent, and plays a smaller role in signalling in actual discourse than a text-based approach might lead us to expect (Goatly 1997: Chapter 6). In addition, many of the metaphors occurred in immediate Frames that are likely to be processed as formulae. I suggest therefore that signalling metaphor through contrast works more effectively at the level of the Episode.

Before a metaphor is used in an episode, the Topic domain has usually been talked about in the discourse. This sets up the discourse context of the Frame into which the Vehicle term is inserted. In only 13 of the 83 MFEs examined, could the beginning of an Episode have been simultaneous with the first use of a metaphor, and these instances would usually resemble the "Agenda Setting" metaphor in the first line of the extract *let's go back to these rocks*, rather than metaphor with important ideational content. In the rest, some aspect of the Topic domain is first talked about in the interaction between speaker and addressee.

The Vehicle term when first mentioned is thus highlighted through its contrast with the Topic domain. For many prosaic metaphors, as in Extract 16, the contrast is fairly small, but the effect is maximised by the positioning of the first use of Vehicle term(s). More novel metaphors, with strong contrasts between Vehicle and Topic, might be expected to be more likely to be positioned early in an Episode, but my corpus does not allow this hypothesis to be tested.

Highlighting the approach of metaphor through contrast can function to prime the need for metaphorical interpretation, and this may be particularly important for children who sometimes fail to spot the need for a metaphorical interpretation (Wales and Coffey 1986; Gibbs 1987), and therefore fail to understand the intended meaning.

(2) Emphasis by position of Vehicle clause constituent

It can be noted that in the extract, each occurrence of the three noun phrase Vehicle terms referring to lava occurs in clause-final position, and the first use of each occurs also in turn-final position. Such positioning serves to emphasise and focus attention on the Vehicle term, marking it to the receiver as potentially ideationally important.

(3) Pausing

Each of the first uses of the noun phrase Vehicles referring to lava in Extract 16 is preceded by a pause, and this is consistent for noun phrase Vehicle terms across the data.

The more anomalous the Vehicle, relative to the Topic domain, the more likely it is to be preceded by a pause. Strässler's analysis of idiom in spoken discourse found that idioms were often framed with micropauses and with inhalation, phenomena which he labelled "idiomatic markers" (Strässler 1982: 98). Intuitively such markers would seem to mark the pronouncement of something anomalous, that the receiver might find hard to believe in. In my data, it is also found marking other non-metaphorical, but rather unexpected lexical items; for example:

Extract 17 Pausing and non-metaphorical language

GEOLOGY LESSON

in amongst the speckles (1.0)
are what look like (.)
pink blobs (2.0)
and that's the shap granite

(Geology lesson 5: 440-442)

In this example, *blobs* is a decidedly non-technical way to refer to the precise technicality of *shap granite*, and the pause may reflect this anomaly.

Intonation would seem to be another device that may be used to signal metaphors in interaction, but since I did not transcribe for intonation, I can follow this hunch no further. Supra-segmental phonological features, including pausing, intonation, use of accent or other voices, may play a parallel role in signalling metaphor in talk to Goatly's "orthographic devices" in text (Goatly 1997:189).

(4) Emphasis through lexical marking

The word *like* is the most frequently discussed marker of metaphorical comparison, but the data shows other words and phrases used in this role:

just imagine (line 15 in Extract 16)

actually (line 16)

which function to mark for the receiver the type of interpretation that is required. *just imagine* gives the receiver a very strong hint that metaphorical interpretation will be called for; *actually* seems to point receivers to make a non-metaphorical interpretation of *melts*, which, perhaps because of its rheme position and its semantic content, risks being understood as a metaphor. There is no instance in the data of the explicit marker *metaphorically* being used; rather, the opposite appears to happen more often, with the appropriacy of a literal interpretation marked, as if to warn the receiver off attempting a metaphorical interpretation of anomalous items. This suggests both that the producer is aware, at some level, of the potential for a metaphorical interpretation of the lexical items

they are about to produce, and, at a more general level, that participants in interaction perceive each other as likely to process anomalous items metaphorically, especially when, as here, they are marked in other ways that may imply metaphoricity. Communicative risk lies, not just in misinterpreting metaphor, but in interpreting non-metaphorical language metaphorically. Speakers may use lexical markers of metaphoricity and non-metaphoricity to manage the risk of inappropriate interpretation.

Signalling the use of metaphor: Summary

The multiple use of metaphor, together with signalling features of semantic contrast, positioning, pausing and lexical marking, work in combination to mark the metaphorical use of language in the interaction between discourse participants. I am not suggesting that all the various ways of lexically marking metaphor use (see also Goatly 1997: Table 6.4) are deliberately employed to signal metaphor use, but that they have this effect as an outcome of their use in the particular discourse context. As such, they serve to indicate to a receiver that a metaphorical interpretation is appropriate, and, more subtly, they can indicate very precisely which lexical items are being used metaphorically, and which are being used non-metaphorically. Signalling thus overlaps with supporting understanding.

6.3.5 Supporting the understanding of metaphor in discourse

The data analysis has shown that speakers consistently use a variety of ways to provide information that will assist the receiver in reaching an appropriate interpretation of metaphorical language. This is in line with the processing framework set up to underpin this study (Chapter 2). A connectionist perspective would additionally predict that there would be an element of redundancy in this assistance. We might further expect support given to each other by discourse participants to be roughly tuned to a speaker's perceptions of the receiver's background knowledge and participation in the discourse up to this point. The analysis of the data in Chapter 5 has shown that the following mechanisms provide information that could be used to meet the demands of processing metaphor in interaction.

(1) Use of pre- and post-modification of Vehicle terms

In Extract 16, the pre-modifying adjectives *sticky* and *rummy* serve to constrain the features of the Vehicle nouns *treacle* and *butter* that may be activated by the receiver, so that colour, taste, uses, etc., which are irrelevant to an appropriate metaphorical interpretation, are inhibited, and the consistency and physical properties are enhanced.

(2) Repetition of Vehicle and metaphor

As we saw in the previous chapter, metaphors, once used in spoken discourse, seem likely to be repeated, either exactly or with slight changes in form, providing more than one opportunity to hear the same metaphor in slightly different linguistic contexts.

(3) Relexicalisation of the metaphor

Relexicalisation - the use of a different metaphor Vehicle to refer to the same Topic - was found to occur regularly when concepts are being explained through metaphor. Once a metaphor for a particular Topic is used, it is likely that one or more further metaphors for the same Topic will occur, with a high degree of local systematicity, as it does in Extract 16 with *treacle - butter -wax*.

The activated information for each Vehicle will interact, reinforcing particular aspects they have in common.. downplaying aspects that are salient to only one or two of them, and thus producing weighted cues to an appropriate interpretation. This effect of overlapping metaphors will increase dramatically as the number of relexicalisations increases, and the receiver is working in a very different informational context from that generated by many theoretical views of metaphor, in which the single occurrence of the metaphor provides the total information context e.g. the relational view of metaphor (Kittay 1987), or salience-imbalance theory (Ortony 1979).

Incidentally, Black's notion of "emphasis" (1993:26), which is concerned with the indispensability of particular metaphors, appears to disintegrate for metaphor in prosaic interaction, where the focus terms of metaphors are frequently, indeed normally, relexicalised. Emphasis, in its more everyday sense, appears to be generated, not through isolation of a particular focus that requires the receiver to put in extra processing work, but rather through repetition or relexicalisation. This may also lead to emphasis through increased processing, but with an increased frequency of encounters with the same or similar metaphor accompanied by a lower level of attention demand.

(4) Development of metaphor

As we have seen, the information available to the receiver of interactional metaphor does not stop with repetition and relexicalisation. Use of metaphor is also likely to be accompanied by direct explication, through processes of expansion, elaboration and exemplification, and through contextualisation, relating to personal experiences of discourse participants We can see this happening in Extract 16:

lines 12-17: before the metaphorical comparison with *sticky treacle* is actually produced, the idea of *molten rocks* and *rock getting so hot it actually melts* has been

well established, through reference to the children's own knowledge. The key word *rock(s)* is repeated 4 times in the turn that contain the metaphor, and the focus of the metaphor is developed through the lexical chain *fire-formed ~ molten ~ hot ~ melts*. When the metaphor is used, it serves to summarise the already presented information, as well as to potentially present new information.

lines 31 - end: The use of the second metaphor *runny butter* (line 20) narrows down further the possible links that might be made between Topic and Vehicles to characteristics that belong to both Vehicles. From line 31, the teacher begins to develop the Vehicle-related information through elaboration (what happens to runny butter if it gets too hot) and contextualisation (personal experiences with the micro-wave oven - *I did it at the weekend*). Expansion of the idea takes place from line 32, through the development of *two things* that happen to butter, and listeners are reminded of the metaphorical nature of the development in line 33, when *volcanic rocks* are again mentioned.

(5) Negotiation of meaning

A final mechanism that seems to support the sharing of meaning occurs when participants in interaction are able to jointly negotiate the meaning of metaphorical language. In Extract 16, the teacher opens up the talk from line 22 with her direct question to the pupils. This enables shared experience to be used to develop the metaphorical meaning. When, in line 29, a pupil offers a further Vehicle for the original Topic - *is molten lava like wax?* and receives positive, if minimal, feedback, she is negotiating her interpretation to date.

Pupils' spontaneous repetition of striking metaphor terms (noted in Chapter 5, Section 5.12.4) can be seen as a kind of self-interactive negotiation, in which the voiced repetition suggests some kind of internal mental debate is taking place.

Both negotiation and relexicalisation may result in the metaphor being heard in several different syntactic forms, adding to the amount of information available in processing.

Supporting the understanding of metaphor in discourse: summary

Form and novelty seem to influence whether metaphors are repeated, relexicalised or explicated. For the most novel, usually nominal, metaphors, all three are likely to occur. For the most frequent verb metaphors, repetition and relexicalisation are more likely with some use of literal antonyms:

my brain won't manage that (1.0) I can't imagine it

(Maths 1 - Tape 6: 99-100)

some people had thought this through but didn't finish it

(Maths 2 - Tape 2: 240)

Negotiation, repetition and relexicalisation may result in a metaphor being heard in several different syntactic forms and lexical contexts, which will increase the information available in processing for meaning. Support for understanding is provided through various combinations and clusters of mechanisms such as those described in this section. Such patterns of language use around prosaic metaphors were consistently found across the data.

6.3.6 Accounting for consistency in metaphor use : summary

Overall, the impact of these patterns of talk around metaphor is to provide quite finely-tuned support for successful processing through drawing attention to the need for metaphorical or non-metaphorical interpretation and through providing various types of supporting information that helps participants reach appropriate understandings. An interactional approach to metaphor use (Chapter 1, Section 1.5.1) suggests that if such phenomena are consistently found in talk, then an explanation for this should be sought in the nature of the talk and the discourse context (Edwards 1997). I develop this explanatory theory further in 6.5.1 below, suggesting at this point that the demands of processing information in particular discourse contexts leads to patterns of signalling and support such as have been described.

The context of education may produce metaphor use with signalling and support as a result of teachers' general pedagogic aims of increasing children's understanding of the world, and their skills in fine-tuning discourse. However, there is some evidence from studies of non-classroom talk, including general conversation and counselling talk of adults (Carter and McCarthy 1995, Strässler 1982, Drew and Holt 1988, McCarthy 1988, Tannen 1989, Quinn 1991) to suggest that the characteristics of metaphor in use described in the last two sections do occur in other types of discourse.

- ◆ I hypothesise therefore that metaphor in spoken discourse will be generally found to be signalled and supported in similar ways, and would expect that different discourse contexts and participants will produce different clusterings of the mechanisms available for signalling and support.

If this hypothesis is correct, analysis of the discourse context should provide information that will enable prediction of which mechanisms will be employed.

A further issue concerns written texts and the nature of signalling and support for metaphor that may be found in them.

- ◆ The discourse context of metaphor in written text could also be expected to contain support to understanding, but perhaps through somewhat different mechanisms and less frequently, because of differences in discourse context.

For example, writers are less able to fine-tune their texts directly for specific readers. If metaphor in written text differs extensively from metaphor in talk, the implications for readers, and in particular for child readers, need exploring.

6.4 Metaphor as risk

Before moving on, I briefly consider the implications of the previous section for the notion that using metaphor in interaction presents a particularly "risky communicative strategy" (Goatly 1997:168). At the processing level, the demands of producing and making sense of metaphor in on-going talk are, as we have seen, accompanied by a range of support and risk-management mechanisms, within the discourse context of the metaphor. The risk attached to metaphorical use of language appears to be minimised in spoken interaction, partly through the way information is spread across other parts of the talk rather than concentrated in the metaphor, and partly through fine-tuning to the perceived needs of participants. The discussion in the previous three sections suggests a re-assessment of the notion that using metaphor is risky.

6.4.1 Sources of risk in the use of metaphor

The most commonly mentioned source of risk in the use of poetic metaphor is that the gap between Topic and Vehicle will be too wide and lead to failure in communication through a receiver's inability to make sense of the two juxtaposed ideas (Toolan 1996; Goatly 1997). The review of studies of children's comprehension of metaphor (Chapter 2, Section 2.5) has also suggested that risk of misunderstanding in discourse involving children may be generated by their failure to notice that a metaphorical interpretation is needed, by their being satisfied with a less than adequately full interpretation of the metaphor, and by lack of Vehicle domain knowledge. The results of the first investigation also produced a further potential source of risk in the use of prosaic metaphor: that of over-simplification and generalisation of ideational content through the nature of selected Vehicle terms.

6.4.2 Re-assessing risk in metaphor use

It may be that the communicative risk of metaphor is more of a theoretically-derived problem for a researcher approaching data as an outsider than a real problem for

participants. As Schegloff says about a similar and related issue, ambiguity in conversation:

Talk being designed by conversationalists for what the other does and does not know, such design can be expected to avoid in advance much of the potential ambiguity for the co-participants. (Schegloff 1984: 100)

He further warns that language as a "powerful, natural object" operates through exactly these types of contextualised, sequential, design features, and that by not attending to them, we change the very object of analysis (ibid). I suggest that the results of the first empirical investigation demonstrate that something parallel is true for metaphor: prosaic metaphor, analysed within its context of use, is essentially different from metaphor as device analysed in isolation.

Strong, active metaphor, especially if isolated in discourse, may present more of a risk.

- ◆ My basic premise is that, given an underlying goal of reaching shared understanding, participants in discourse will work to manage risk effectively. Thus, if strong, active or poetic metaphor does present an increased risk, my hypothesis would be that the raising of the comprehension stakes is itself, in some way, deliberate and goal-directed.

For example, "risk" may be another way of describing the de-familiarisation that poets may aim at creating, in order to engage the listener or reader with ideas through the extra processing work they are obliged to do.

- ◆ Conversely, it would also follow that if use of metaphor in interaction does present increased risks to understanding through higher processing demands, then extra support would be provided to compensate, for example through visual support in the discourse context or the provision of extra processing time.

I suggest that "risk" in use of metaphor is not the interactional problem it is sometimes made out to be. Since people participating in discourse usually want to make sense to each other, any risk is likely to be minimised and managed in interaction. The sensitive interactional mechanisms that avoid and control risk are, I would suggest, of more empirical interest. However, metaphor may still present a risk educationally through the downwards cognitive shift and over-generality of some Vehicle terms of metaphors used in classroom discourse. The effect of this may be particularly significant when

systematicity leads to frequent repetition of related, and cognitively inappropriate metaphors.

The argument that processing demands of discourse, interacting with the language and cognitive resources brought to the discourse by participants, can explain the use and nature of prosaic metaphor is now taken further, as the continuity of prosaic metaphor with other types of language use is discussed.

6.5 The boundaries of metaphor

All uses of language tend to stretch it; but in literal uses, language bounces back. Metaphors stretch language beyond its elastic limit. (Ortony 1993:355)

In this section, I use examples of boundary decisions made in analysing the data to develop my argument that metaphor is special in language use, because it takes us to the edge of our skills with language, but it is not a distinctly different use of language, as Ortony and many others claim. Metaphor makes use of human skills in reasoning and in interaction which are basic and fundamental, not special and unique. Developing shared understanding in interaction requires full and skilful use of linguistic and cognitive resources, such as exploiting ambiguity, analogical reasoning and extending existing meanings of words. In "stretching" these resources to the limits we sometimes generate metaphor, just as we sometimes generate other edge-of-language-phenomena such as humour, hyperbole and ellipsis. Taking an analogy from complexity theory, metaphor can be seen as an emergent outcome of human language use "on the edge of chaos" (Waldrop 1992). Complex dynamic systems, which as I have suggested in Chapter 1, can include language in use in a particular discourse context, appear to adapt to three possible states (Kauffman 1993:29). They may exhibit stability and order, they may move into chaotic behaviour, or they can exhibit complex behaviour in which they operate on the border between order and chaos. In this "edge of chaos" area the system has the greatest potential for adaptation, behaviour is most flexible and the complexity of tasks the system can perform is optimised (Kauffman 1993). I will argue that the metaphorical use of delexicalised verbs falls as clearly into this area, as does poetic, literary metaphor, and that it arises from the same resource-stretching processes in response to processing demands.

Language in use is not, as Ortony seems to imply, a closed system that, being "elastic", can be stretched but has its breaking point. Seen as (or at least, in analogy with) a dynamic, adaptive system, language in use will "stretch" as far as the users of it can cope

with at any particular point. But that stretching can be permanent, it marks the growth point of the system, and future growth will start from this new point, not from an earlier one to which it has bounced back. If language is used beyond its current range of adaptability, the results would not be metaphor, but rather would be the chaos of incomprehensibility. This argument would apply to interactional use of language between individuals, and at a broader level of speech community use of language. It may well be that attempts at novel metaphor may be particularly prone to stretching language beyond its limit; for example, when I encountered the instruction on my computer screen to *toggle the switch*, I was reduced to frustration because I could make no sense of this, having tried to connect *duffel coats* to word processing to no avail.

Metaphor that is comprehensible, though, remains on the border between incomprehensibility and the non-metaphorical, and it is in this border area that we have the greatest potential for creativity and adaptation to contextual demands.

I am further claiming that this is true of prosaic metaphor as much as of poetic metaphor. Indeed, it may be that there is more adaptation and creativity going on with prosaic metaphor, but that much of it remains below our level of awareness. The development of metaphor theory from isolated examples of strongly poetic metaphor, presumably because they stand out as obvious, has misled us into seeing metaphor as a separate and special use of language. It may seem at this point that I am merely echoing the claims of cognitive linguists such as Lakoff and Johnson, or Gibbs, who also claim that metaphor is pervasive and everyday. They however seek a role for poetic metaphor in everyday language, working, as it were, downwards from poetic uses of metaphor, whereas I start from prosaic metaphor and work upwards to poetic metaphor in a Bakhtinian fashion. Although it is possible to reach identical conclusions, it is also possible that the nature of inferences made in the two directions are very different. Most metaphor theory, by working outwards from constructed or carefully selected examples of metaphor has generated a bird's eye view of metaphor as special and unique, rather as someone in an aeroplane could perceive the tops of high mountains above the clouds as unconnected with the rest of the earth's surface. Having perceived and observed closely a collection of mountain tops, it would be possible to generalise and abstract features and definitions, and develop explanatory theories about mountain tops, without ever needing to go below the clouds. However, those theories of mountain tops might be quite different from theories developed as a result of observing the same mountains from sea level, which could include hypotheses about the formation of mountains by the movement of the

earth's crust, could explain such phenomena as the continuities of layers of rock types, the gradual changes in the soil quality, climate and vegetation with height.

The process of identifying linguistic metaphors in the corpus of data revealed the slipperiness of the boundaries of metaphor on all sides. Consideration of real boundary decisions will show how, with a corpus of discourse data as starting point as reflecting the surface of language and thought, metaphor refuses to be disconnected from other features of language in use. In the following sections, I examine a range of aspects of language use from which metaphor had to be separated in the data analysis, and how this separation time and again required the imposition of an artificial and arbitrary division by the researcher. We will also encounter some of the gaps that appear between "mountain-top downwards" theory and "sea-level upwards" investigation results.

6.5.1 Metaphor and simile

The risk of working from single sentence examples can be most vividly seen in the gap between theoretical discussions around the nature of metaphors and similes and the instances in the empirical data. Many of the papers in the key metaphor theory text "Metaphor and Thought" (Ortony (ed) 1993 (2nd edition)) - including those by Miller, Ortony, Glucksberg and Keysar - discuss ways in which simile and metaphor can be held to differ, and how they can be seen to relate to literal comparisons, to non-literal comparisons or to class-inclusion statements. Differences between metaphor and simile are found in:

- the potential for *paraphrasing* with or without "like" (metaphors can, some similes cannot)
- the potential for *reversibility* (some similes that are literal comparisons can be reversed, metaphors cannot)
- the *category level of Vehicle terms* (same level for literal comparisons, prototypical example of more general category for metaphors).

Very few of the metaphors identified in my discourse data worked according to these types of operations:

Paraphrasing

the rock... melts .. becomes like sticky treacle (Geology - Tape 5:364)

Here, two incongruous domains *rock* and *sticky treacle* are linked, fulfilling the necessary conditions for metaphor. However, paraphrasing this as metaphor

the rock becomes sticky treacle

produces, what to me, would be an unacceptable statement, in the discourse event of a geology lesson as part of teacher - pupil discourse on the topic of volcanic lava.

In a second problematic example:

crinoids ... they're like (.) mini-animals (Geology - Tape 5: 299)

there are again two distinct domains (animals and plants), and even an appearance of a class-inclusion, supporting identification as metaphor. But if we were to follow Miller (1993:381) and omit the *like*, what is produced is not a metaphor, but a false statement

crinoids are mini-animals.

In some instances, discourse participants do move between using and not using *like* i.e. they do the paraphrasing themselves. However, there appears to be a degree of arbitrariness about whether *like* is used in repetition and relexicalisation; sometimes there is a continuity between metaphor and simile as what appears to be a metaphor is elsewhere encoded as a simile, as in the Lollipop Trees episode (Extract 13).

Reversibility

Some non-literal comparisons appear in the data only in non-simile form, even though the addition of "like" would make no difference to meaning or comprehension demands:

remember you're spokes in a wheel (Dance - Tape 4:175)

This is paraphraseable, although it is not paraphrased, but it is not reversible as it stands, supporting its status as metaphor.

In other instances, metaphorical simile seems to slip into literal comparison, as with the three comparisons in the Geology lesson (Extract 16):

rock becomes like sticky treacle...

like runny butter

is lava like wax?

The clue to finding the root of the confusion, and thus a way out of it, lies in the suggestion made by Glucksberg and Keysar that metaphoricality is reduced by 'hedges' (in Ortony (ed) 1993). Using a set of examples which includes:

cigarettes are time bombs

cigarettes are like time bombs

cigarettes are deadly like time-bombs (Glucksberg and Keysar 1993: 417)

they suggest that the first (typical M-D) metaphor is 'more' metaphorical than the other two because of the extra information provided by the hedges in the other two. By including explicit references to the salient predicates of the Vehicle term, the degree of implicative elaboration, or resonance (Black 1979), is reduced. Glucksberg and Keysar

(G and K) use this example and the notion of hedges to support their view of metaphor as class-inclusion, but I would see the importance of their insight in terms of processing demands. Understanding the first example requires the receiver to work, with what looks like a class-inclusion statement, to produce the grounds stated in the third example. If the receiver of the metaphor has to come to this understanding in order to make sense of the metaphor *cigarettes are time bombs* then G and K are in fact saying that metaphoricity lies only in the surface form; once processed successfully, the metaphor has become a literal proposition - *cigarettes are dangerous*.

Moreover, their theoretical view then further implies that spoken discourse is unlikely ever to include utterances that can be classed as 'metaphor' since, as we have seen, most metaphors in talk are well-hedged, through combinations of repetition, relexicalisation and explication, and have often been stated non-metaphorically before the Vehicle term is first mentioned.

An alternative account of 'hedging' found in Metaphor Framing Episodes has been developed in 5.13.1 and in 6.3.5 above, where I hypothesised that these mechanisms act as support for understanding, perhaps simultaneously reflecting constraints on the processes of production, and occurring because in some way they match the needs of the particular interaction and discourse context. The amount of work that participants in interaction give each other to do must be controlled, otherwise the interaction would break down. So, in turn, the creativity of metaphor use must be controlled by the inclusion of enough relevant information to facilitate processing. The "three bears principle" of Seidenberg (1989: 51) may also be invoked to suggest that not too much relevant information in the form of hedges will be included or the interaction may fail through lack of involvement. In other words, the degree of metaphoricity will be appropriate to the type and context of discourse, and metaphorical language in talk will carry an appropriate degree of metaphoricity for the processing demands of that talk. Metaphoricity is a graded feature, but it is also relative to the type and context of the discourse; for a theory of metaphor as use, the metaphoricity norm is not that of *A is B* metaphors, but, rather, the norm itself is dynamic, varying with the type and context of discourse.

It is not necessary then to follow through the implications of G and K's theoretical stand that what is found in talk is not 'metaphor'. Instead, a broader theoretical view of metaphorical use of language can be taken that includes the information provided as 'hedges' around a metaphor, not as extra, but as central to what must be accounted for.

We can then examine more closely the nature of supporting information provided by metaphor 'hedges', for guidance as to the type of work that may have to be done mentally when more isolated poetic metaphors are encountered in written texts. I will from now on use the label "metaphor supporting information" in place of the term "hedges", as better representing the function of such uses of language from a discourse perspective.

Listing the nature of information provided in the interaction in the Volcanic Lava Episode - Extract 16, and mapping this on to the terms used in Table 5.10, shows that the discourse surrounding a linguistic metaphor can provide information to serve the following purposes (Table 6.6):

- **Topic development** - to provide more information about the Topic, particularly about salient features of the Topic
- **Metaphor signal** - to signal the metaphor
- **Vehicle development** - more information about salient features of the Vehicle
- **Vehicle contextualisation** - relating Vehicle to personal experiences of discourse participants
- **Metaphor construction** - to make a new link between Topic and Vehicle

These labels are designed to be consistent with those used by Steen (1992), who identified them from think-aloud protocols produced by adults in a study of metaphors in journalism and fiction. They will be used in the next empirical investigation, where they are employed to describe the nature of information given in interaction and information in think-aloud protocols i.e. information that subjects "give to themselves". At this point, the phenomenon of language use around metaphors in MFEs, described in 5.13.1 is taken a step forwards into explanation.

Table 6.6 Metaphor -supporting information produced in the Volcano episode

Ideational content linked to Metaphor Topics and Vehicles	Type of supporting information
(1) <i>rocks.. fire-formed</i>	Topic development
(2) <i>volcano</i>	Topic development
(3) <i>rocks that are formed by fire</i>	Topic development
(4) <i>the rocks that are molten</i>	key feature - Topic development
(5) <i>molten rocks</i>	key feature - Topic development
(6) <i>just imagine rock getting so hot it actually melts</i>	Metaphor signal key feature - Topic development
(7) <i>it becomes like sticky treacle</i>	metaphor 1
(8) <i>even like runny butter</i>	metaphor 2
(9) <i>have you ever put ...butter into the microwave? ... I did it at the weekend</i>	Vehicle contextualisation
(10) <i>is molten lava like wax?</i>	metaphor construction
(11) <i>it bubbles</i>	Vehicle 2 development

(12) <i>it sort of keeps doing this?????</i>	Vehicle 2 development
(13) <i>so that's where these rocks come from</i>	Topic development. summary

By the time the first simile/metaphor occurs, it has been clearly explicated. The key features of *molten* are repeated before the metaphor occurs and then afterwards to link Topic and Vehicle.

If the statements (7), (8) (10) from the Volcanic Lava episode were extracted from their discourse context, they would bear some resemblance to metaphors of the *A is B* type. However, as we have seen, extracted from discourse context, they do not lend themselves to the analysis derived from *A is B* theory. Rather they need to be considered as interactional metaphors and to have a theoretical framework of their own.

So far this discussion of metaphor and simile has led us into clarifying a theory of metaphor as use. At this point, I return to the notion of simile and try to clarify its relation to prosaic metaphor in interaction. Earlier I have pointed out that "simile" is a concept defined at the level of form, i.e. through the inclusion of *like* or other word with the same function (e.g. Searle in Ortony (Ed.) 1993). "Metaphorical similes" are those similes in which the *like* links items from distinct conceptual domains i.e. satisfying both a surface requirement and a conceptual requirement. With interactive discourse data, a further problem arises when instances of the use of *like* are collected, and the lexical item itself is clearly used with a range of meanings, and with degrees of looseness about its meaning in particular contexts. For example:

campsite ... so it's almost like a holiday village ? (cwt 1 - Tape 1: 698)

Here *like* expresses a literal comparison in terms of function and organisation, which has no metaphorical possibilities because the domains referred too are so close. Sometimes *like* and alternatives such as *sort of*, appear to indicate an approximation rather than a comparison:

there must be as sort of chemical reaction (in fertilisation of egg by sperm)
(cw T1 - Tape 1: 112)

In the next example, the domains linked by *like* are more distant, particularly if one (*your feet*) is taken as 'people in the discourse event', and the other (*Charlie Chaplin('s feet)*) as '2-d images on film'.

(the position of your feet) *looks like Charlie Chaplin...like a kind of shuffle*
(Dance - Tape 5: 70)

In this case, the stretch of language was included as metaphor.

It would seem from the data that *like* can be used metaphorically or non-metaphorically, and that *like* can signal an open-ended comparison or a very particular comparison of a limited number of features, and probably anything between these two extremes. The actual aspects of the Topic-Vehicle domains activated and linked in processing remain, of course, largely unknown from analysis of transcripts, and would require different investigative methods. Meanwhile, as researcher/analyst, I was obliged to make decisions as to the metaphoricity of similes, and domain difference (relative to the discourse context) was the main criterion used. In this preliminary discussion of some of the problems, I hope to have demonstrated the need for a fuller and more adequate, data-based discourse theory of 'prosaic simile', although this remains beyond the scope of the current study.

6.5.2 Other boundary decisions

In this section, I report briefly on range of other decisions that had to be made in constructing the category of linguistic metaphor from the discourse data. Each one demonstrates some aspect of continuity between metaphor and other uses of language, and adds to my argument that prosaic metaphor is creative, but that it probably does not involve any processes distinct from other uses of language.

(1) Extended uses of delexicalised language

Metaphorical use of language was sometimes difficult to distinguish from extended uses of words to refer to meanings slightly beyond the norm. Again, in isolation (as mountain tops) some of these uses had the appearance of typical *A is B* metaphor, but from the corpus of data (working upwards from sea-level) the decision as to where metaphor begins and literal extension ends is tricky and, in the end, arbitrary.

Interactive discourse makes frequent use of delexicalised language, which combines the advantages of extremely flexible meaning potential with the safe-guard of contextual constraints. Conditions for setting boundaries of metaphorical use of delexical language were set up in Chapter 3, and involved the researcher in making decisions about the extent of core/ prototypical meanings (Jackendoff 1992). Each verb and preposition required separate decisions. In use, delexical verbs were often combined with prepositions or adverb particles to extend their meaning further. Extended / metaphorical uses of verbs and prepositions appear to be largely unproblematic to discourse participants, suggesting that the degree of extension must usually match participants' capacity for understanding. Extended uses of delexical verbs and prepositions are a

classic case of prosaic creativity, the simple in need of explanation (Morson and Emerson 1990).

(2) Extended uses of schematic language

When more schematic language is collocated in new ways, it produces language that can be classified either as extended use or as metaphor, and once again this classification is not unproblematic. Within discourse contexts and communities, new uses of words emerge that can sometimes resemble metaphor. The classroom data produced a few of these from both teacher and children. Some were difficult to separate from established use, but seemed to me unusual in some way:

I might cut netball (cwt 1 - Tape 7: 175)

There were also cases where an individualised use of a particular lexical item gradually stretched it away from its established meaning until comparison of the extended use and the established use might suggest metaphor, as with teacher T2's use of the verb *think* (discussed in 5.10.4).

The use of delexicalised language in discourse does not thus differ in basic ways from uses made of more highly lexical language, both are "stretched" by being collocated in new ways. Sometimes this stretched collocation produces language that may be classed as metaphorical.

(3) Hyperbole

Hyperbole might be seen as a special case of extended meaning in which quantifiers, gradable adjectives and so on are extended to extremes. As with simile, it would seem that the use of hyperbole can be either metaphorical or non-metaphorical

Metaphorical	<i>being able to have grommets in is almost miraculous</i>	(TV - Tape 1: 483)
	<i>you all deserve a medal</i>	(Dance - Tape 5: 91)
Non-metaphorical	<i>shall I do some Maths? ..cos I've done millions of..</i>	(cw T1 -Tape 3:735)

The boundary between metaphorical and non-metaphorical hyperbole is again far from obvious, although uses away from the boundary are unproblematic. Once again, there seems nothing special about metaphorical hyperbole, rather it is a further example of a language resource, in this case drawn on for emphasis.

(4) Misuse and error

This is a different type of boundary decision, with links to metaphor derived from on-line processing. When errors produce a different lexical item from that probably intended, it would be possible to identify metaphor, but I argue this would be inappropriate. In terms of the "above the clouds" analogy, such metaphor-like errors can be seen as equivalent to church spires or lighthouses, that have certain features in common with mountains, but none of the essential features.

The tolerance of error in processing, evidenced by lack of comment and self- or other-correction, illustrates something of the processes and skills of making sense of on-going interaction through the active on-going construction of meaning, built on expectations and previous talk, in the discourse context. It is just this same active processing that enables us to make sense of metaphorical language too, making use of the accumulated information from expectations, from previous talk, from the interactional context, and from phonology, morphology, syntax and semantics of the language. Just as the ambiguity created by errors or ellipsis is resolved without difficulty, so too is the ambiguity of metaphorical use of language.

(5) Shared discourse world language use: ellipsis and metonymy

I'm supposed to be hearing a table read (Class Work 1 -Tape 7:194)

you packed lunches on there .. hands together..eyes closed

(Lunch time - Tape 4:211)

One of the advantages of considering language in use as a complex adaptive system is that it requires account to be taken of the interaction between system and context, at all points. The system adapts through interaction with the context, and the same initial conditions will give rise to very different systems if the contexts differ. When considering oral interaction in classrooms, or other context of use, we must see the system - spoken language - as adapting through interaction with context i.e. with the participants, the goals and the situation. Identification of metaphorical language in the classroom data made the effect of this particularly clear.

While the context provides an explanation of the content, the processing demands of interactive discourse can provide an explanation for the generation of such ellipsis. Within interaction, the use of context-derived ellipsis will cut down the amount of information that a producer needs to explicitly mention, and increase efficiency. When a receiver encounters this type of language, the schemata activated will take into account the context and shared knowledge, enabling sense to be made of the ellipsis without

recourse to a metaphorical interpretation. The risk of misunderstanding will be minimal when the producer estimates the shared knowledge accurately.

Such uses of language then demonstrate two things.

Firstly, such uses of language highlight the flexibility with which producers of language draw on their resources to find ways to express their meanings in ways their interlocutors will understand, while minimising their communicative effort.

Secondly, they suggest that this flexibility probably exploits the same resources as producing and understanding metaphorical language use, and the boundary decisions required of a researcher.

(6) Allusions, mini-dramas, funny voices

On several occasions during the recording, the pupils switch into other voices (literally, as well as in the metaphorical sense of Maybin 1996). This happened in pupil-pupil talk away from the hearing of adults, as over their lunch or when standing in a queue at the teacher's desk. The voices and roles adopted are usually those of adults, as when two pupils, while eating their sandwiches, acted out a policeman stopping a driver who had been drinking, or when one girl said to another, in the voice of a teacher:

you ought to be proud of yourself my girl (cwt 1- Tape 7: 193)

Sometimes the adult voice was adopted for a single utterance, and at other times continued over several turns, resulting in the playing out of a sort of "mini-drama". Such interludes do import a second semantic content into the talk and, in this, resemble the importing of incongruous lexical items required for metaphor. However, the absence of links between this second semantic content and the on-going discourse event meant that no metaphorical intention could be ascribed in these instances.

What is clear from the occurrence of such inserted discourse events is the amazing availability of all types of mental schemata that may be called on by discourse participants, or may appear to invite themselves into the conversation at a moment's notice. They serve as a healthy reminder of the resources and processing power brought to participation in spoken discourse.

6.5.3 Theoretical implications of boundary decisions: summary

The boundary decisions that had to be made in analysing the data can be seen as arising from a range of language and cognitive resources linked to the production of metaphor,

and a range of processing mechanisms employed in understanding metaphor, where both production and understanding are analysed as contextualised with discourse events. While the description of boundary issues highlights the limits of metaphor, these possible sources of boundary issues help to explain metaphor in discourse.

- ◆ In interactive, contextualised use of language, metaphor can be seen as emerging from the exploitation of creativity in the service of, and constrained by, reaching goals of shared understanding.

The resources and mechanisms that lead to metaphor are summarised in Table 6.7:

Table 6.7 *Language and cognitive resources that produce metaphor in interaction*

production	understanding
adding metaphor supporting information in various linguistic forms	using metaphor supporting information to make sense of what is heard
making comparisons and approximations of various types	making sense of comparisons and approximations: features and range
extending meanings of established words, delexical and schematic	working out newly extended meanings
creating new words from old	making sense of newly coined words
creating and using shared elliptic lexical items within a discourse community	coping with misuse and error; making sense of shared world ellipsis
making allusions through voices and scenarios	understanding full and appropriate reference of allusions

I suggest that it is precisely these resources and processing mechanisms that result in prosaic metaphor production and comprehension, and that most prosaic metaphor emerges from the adaptation of language in use in context, the "stretching" of interactional language resources, into the border area on the edge of chaos. Emergent metaphor can then be distinguished from deliberate metaphor, which more consciously exploits these mechanisms and resources. Deliberate metaphor does occur in interaction when participants notice the potential of the language they are using to do more than one thing at once, and take advantage of it, but novel and creative metaphor is much more likely to arise in different types of discourse contexts, such as writing or rhetoric, where processing demands allow for conscious exploitation of the potential of language.

If we return to the mountain tops analogy, we can observe that mountains are created by the movement of the earth's crust, not deliberately and as pre-planned outcomes, but as an emergent phenomenon, a by-product. Prosaic metaphor can be seen as largely emergent in both production and comprehension. In comprehension, the range of resources and mechanisms available ensures that a finely-tuned speaker can more or less guarantee a listener's understanding; misunderstanding is likely to come from misjudging the receiver's previous knowledge. In production, any one of the resources in Table 6.7 can lead to metaphorical language; it is also possible to use a combination of resources.

What becomes clear from a complex systems approach is that identification is not definition; when linguistic metaphor is identified in spoken discourse, this can be done with a combination of necessary features (potential incongruity) and arbitrary boundary decisions. A theoretical framework for prosaic metaphor needs to be contextualised and to take account of processing demands and language use. The struggle to define emergent prosaic metaphor now, thankfully, becomes redundant. Having followed Wittgenstein's advice to consider examples and non-examples, I hope to have reached some understanding of what prosaic metaphor is.

The coherence of the category 'prosaic metaphor' was initially assumed, but now it has been established for one set of discourse data, this assumption can be examined. The category is broad in membership, although more restricted than the Aristotelian category, which included a wider range of figurative forms. Within the category, there appear to be potentially important differences of type between nominal and verb metaphors in the way they are developed and used, although this is overlaid and confounded by differences between schematic and delexical words used as metaphor Vehicles. From an interactional point of view, similarities in use may justify keeping them together, although further, more detailed discourse analysis might reveal distinctions to support splitting the category. I suggest meanwhile that the graded dimensions of metaphor and grammatical framework that have been developed in this study will be adequate to describe different types of prosaic metaphor. Moreover, it may well be the case that such a framework would also serve deliberate, poetic metaphor. The task of demonstrating that, however, is left to others.

6.6 Conclusion: The Continuity Issue revisited

What then of the issue of continuity between prosaic and poetic metaphor? It would seem that the possibility that deliberate, poetic metaphor is discontinuous from prosaic metaphor still remains, in that the processing of poetic metaphor, in production and / or

comprehension, may differ in some essential ways from the processing of prosaic metaphor. We must at this point, however, recall that 'poetic metaphor' and 'prosaic metaphor' are theoretical constructs. They arise from two distinct approaches to the investigation of metaphor: a poetic approach starts with the notion of metaphor as device and identifies, as poetic metaphor, clear examples of the use of that figurative device. There is an in-built assumption of intention, of active, metaphorical processing, of novelty and a high degree of incongruity. The prosaic approach developed in this thesis has generated the category of prosaic metaphor through collecting stretches of language that look something like poetic metaphor and then refining conditions of membership. The category of prosaic metaphor will, by design, include poetic metaphor found in discourse, and in this, limited, sense the poetic is continuous with the prosaic: i.e. the theory puts them in the same category. The more interesting continuity question is, it seems to me, whether the category of poetic metaphor would include prosaic metaphors as identified in this study, as seems to be assumed by Gibbs (1994), Lakoff and Johnson (1980) and others working with the notion that metaphor is ordinary and ubiquitous. Since the category of poetic metaphor appears not to have been theoretically delimited, in that no statements appear that put a minimal level of metaphoricity on potential category members, the question remains unanswerable.

If evidence of discontinuity between poetic and prosaic metaphor is to be found, I suggest that it will be manifested in processing. A key factor of typical poetic metaphor is deliberate construction through skilled use of linguistic and conceptual resources. This investigation suggests that more interactional support, time or processing capacity is required to make sense of such poetic metaphor; it is also likely that the nature of processing required to produce poetic metaphor through deliberate and skilled construction will be observably distinct.

CHAPTER 7

EMPIRICAL INVESTIGATION 2 - CHILDREN MAKING SENSE OF METAPHOR

7.1 Introduction

Metaphorical language use is clearly important in educational discourse. The first empirical investigation has highlighted the following key aspects of teachers' use of metaphor, through which pupils' experience with metaphor is constructed, and which may impact on learning:

- metaphor plays an important role in the creation, negotiation and control of the 'agenda' of lessons
- metaphor is used in the explanation of key concepts and learning strategies and, as such, has the potential to become a shared referent for teacher and pupils in future discourse
- deliberate, usually one-off, metaphors are used, along with other strategies, to illustrate ideational content
- long-term, systematic, conceptual metaphor use occurs around particular classroom discourse topics e.g. using lexis from the domain of talking and listening in connection with literacy processes
- the use and choice of metaphor in feedback and control sequences is one way in which attitudes to achievement and performance are systematically and repeatedly encoded in classroom discourse
- the teacher or other pupils sometimes mediate the metaphors of others e.g. metaphor in hymns, in maths

This investigation produced no evidence as to the short or long term impact of such experiences with metaphor. It could be observed only that pupils can be held to *notice* some metaphorical language through their reaction and responses; other processing aspects, including comprehension and interpretation (Chapter 2, Section 2.4.1; Gibbs 1994), remained invisible. However, the evidence of metaphor use was suggestive of areas that might benefit from further investigation:

- Children's interpretation of deliberate, ideational metaphor employed with the intention to help understanding of unfamiliar or difficult content
- The short and long term effects of such deliberate metaphor use on understanding and recall
- The ideational and attitudinal effect of long term use in classroom discourse of conceptual metaphor in talking about such areas as literacy processes

- Successful and unsuccessful mediation in reaching shared understanding of metaphorically used language.

These areas are addressed through a second empirical investigation, designed to illuminate how children make sense of metaphors that they encounter in texts, and whether there is evidence of learning as a result of encountering metaphor. In Investigation 2, the focal subject of Investigation 1, Louise, along with one or more of her friends, works with texts and ideas that make intrinsic use of metaphor, in group discussion and in adapted Think Aloud tasks. Before reporting Investigation 2, I first summarise literature on metaphor and learning. I then move to Investigation 2 and report the data collection and analysis procedures. The results are presented and discussed in the following two chapters, yielding insights into the processing of metaphorical use of language by individual children which will be available to complement the information on classroom use of metaphor in a discussion of the implications of the empirical project as a whole.

7.2 Literature review summary: Metaphor and learning

7.2.1 Understanding metaphor

If metaphorical language use is to contribute to children's learning, it must be understood appropriately. The studies reviewed in Chapter 2, Section 2.3 suggested that the major causes of comprehension and interpretation problems for children encountering metaphor stem from both discourse and conceptual problems:

- not realising that metaphorical processing is appropriate at all
- lack of domain knowledge, especially Vehicle knowledge and especially relational knowledge
- inappropriate selection of domain attributes and relations to transfer from Vehicle to Topic.

The results of Investigation 1 have suggested that classroom talk addresses the first problem to some extent, by providing clues that a metaphorical understanding is appropriate in a range of ways in the surrounding discourse. Conceptual problems around domain knowledge may be helped by the various types of supporting information that seem to be included around metaphorical use of language. However, 'understanding' is not a finite, bounded process; a minimal interpretation of a metaphor may be reached, or an interpretation may be elaborated to various degrees (Siltanen 1990). In addition, understandings constructed by receivers may align to varying degrees with those intended by the producer.

7.2.2 Learning from metaphor

Given appropriate understanding, how then may metaphor contribute to the development of children's concepts? Vosniadou suggests that "metaphorical thinking may play an important role in the child's attempts to acquire new knowledge" (1987(a):882). As for adults, knowledge may be transferred from Vehicle to Topic domain, and vice versa. Metaphor may play other roles in cognitive change: for example, by being a vivid use of language, a particular metaphor may be stored in episodic memory along with the information it carries, and serve to facilitate future recall. In this section, I summarise relevant metaphor and cognitive psychology literature which suggests several ways in which metaphor may contribute to cognitive change, both constructively and negatively.

(1) Development in understanding of concepts can sometimes be viewed as the adoption by the learner over time of increasingly complex sets of metaphors
For scientific metaphors, this development is also from concrete and specific to abstract and general.

Strong cognitive change is particularly relevant for children in formal education, who are likely to be in the process of moving from their "spontaneous concepts" to the "scientific concepts" of the adult world (Vygotsky 1962:84), through a series of conceptual restructurings (Carey 1985). Kittay (1987:75) suggests that metaphors can help to bring about restructuring, but they may also have a weaker role in learning, by contributing to the accumulation of propositional or other information about a Topic, through the transfer of attributes from the Vehicle concept domain.

In a study of university students of statistics, Evans and Evans (1989) compared the learning outcomes of listening to statistics lectures, some of which used metaphor and some of which avoided metaphor. Learning outcomes were tested through the students' ability to transfer their understanding to solve problems that were 1) in a domain close to the original, 2) in a familiar but unrelated domain, and 3) in an unfamiliar and unrelated domain. On the first two types of tasks, no differences were found, but in the 'general-transfer' case, to an unfamiliar and unrelated domain, students who had been taught through metaphor performed better than the control group, in that they made fewer conceptual errors. Evans and Evans suggest that students switched to a metaphor-using strategy when confronted with a novel situation, and that their results support the theoretical view of metaphor as contributing to learning through the transfer of relational structure between distant, unrelated domains.

Vosniadou (1989) and Brown (1989) both emphasise that children are cognitively equipped to make analogical transfers between domains, and thus to learn from them, and that failures are more likely to be due to lack of domain knowledge rather than to problems with the analogical process. Gentner and Toupin (1986) report a study in which 4-6 year olds and 8 year olds were compared on their ability to transfer the plot of a story from one set of characters to another, with variation in the transparency of the mapping required. The study showed that all the children could perform such transfers, but that older children became more skilled and more able to be independent of surface similarity through the use of higher-order connecting relations. Thus for children, the probability of cognitive change via encounters with metaphor is likely to be affected by age and domain knowledge.

A study by Roschelle (Roschelle 1992) investigated the processes involved in the negotiation of metaphorically-expressed understandings as two 15 year old girls complete tasks on a computer program designed to teach them about vectors of velocity, force and acceleration. One of the core processes found was the gradual sharing, justifying and refining of the girls' "theory-constitutive metaphors", lexicalised as *pulling* / *adding* / *travelling* / *hinging* (Roschelle 1992: 237).

Additionally, if, as cognitive linguists claim, some of our concepts are not just represented, but actually stored in memory analogically with other concepts (Lakoff and Johnson 1980), then repeated encounters with conceptual metaphor may serve to add to that metaphorical structure. From the classroom data, the domains of mathematics and literacy may be particularly open to such metaphorical development.

(2) *Such complexification can take place over quite a short period of time for a particular concept, and that peer interaction is one discourse mode in which this can effectively happen (Roschelle 1992).*

(3) *Metaphors have a potential cognitive role, not only in structuring concepts through shifting metaphors, but in prompting conceptual restructuring, in problem solving by analogy, and in assisting recall of information.*

The use of metaphor brings an alternative conceptualisation, that of the Vehicle term, into the discourse, perhaps producing conflicts with aspects of the Topic domain that may prompt "noticing" of gaps in understanding (Schmidt 1994), new explanations, and / or restructuring of concepts. Through the comparison or transfer between structures of

Vehicle and Topic, gaps in the structure of the Topic domain may be revealed, leading to a search for new information and understanding, and to knowledge accumulation.

Studies of case-based or exemplar-based problem-solving (Dreyfus and Dreyfus 1986; Medin and Ross 1989) provide a further scenario in which metaphor may play a key role. Problem solving is "often based on specific examples rather than abstract principles" (Medin and Ross 1989:217), with features of a current problem prompting recall of earlier experiences with similar problems and the generation of solutions through analogy. That children can make positive use of analogy has been shown in the learning of early literacy (Goswami 1991). Analogy and metaphor have been shown to be effective in problem solving by adults (Gick and Holyoak 1980) and by children (Holyoak, Junn and Billman 1984). Gentner and Gentner (1983) showed that making a guided analogy with a familiar domain could successfully help in understanding unfamiliar concepts such as electricity. Winner (1988:121) compares the difficulties experienced by older and younger children in solving problems by analogy. Older children failed because they did not notice the possibility of solution by analogy rather than because they did not understand how to make links between the domains; they sometimes needed the possibility of mapping to be made more explicit. Younger children, on the other hand, required the mapping between original and new to be completely explicit, otherwise they could not understand how to make use of the analogy. This points again to the delicacy needed in selecting Vehicle domains, and suggests that the open-endedness of metaphor may sometimes function problematically for younger children; metalinguistic explication, such as that found frequently occurring in metaphor framing episodes (Chapter 6, Section 6.3) might help to increase the cognitive effectiveness of metaphor through narrowing down possible transfers. When children are required to work with written text, such support could be presented orally to supplement the text or in writing as an intrinsic part of the text.

Metaphor may help by working as a mnemonic for how concepts are connected, extending the capacity of memory (Sticht 1993) and acting as one of Bruner's "prosthetic devices by which human beings can exceed or even redefine the 'natural limits' of human functioning" (Bruner 1990:21). I have not been able to find much empirical evidence to support a claim for a positive role for metaphor in reminders, however. Winner (1988) finds only one study, by Arter (1976), that shows metaphorical language use giving advantages in recall.

(4) *To maximise the positive contribution of metaphor, and minimise negative potential, the use of multiple metaphors around one Topic would seem a helpful tool.*

Research on children's understanding of metaphorical language has consistently highlighted how metaphor may only be partially understood because of their partial or inaccurate domain knowledge. I note that this may also be valid for adults, who individually may also bring partial or inaccurate domain knowledge to understanding metaphor. However, there are further potential dangers in the use of metaphorical language which are empirically demonstrated not to be restricted to children's learning, and which derive from the very same properties of metaphor that contribute positively to cognitive change.

Research carried out with medical students demonstrates vividly how initially helpful analogies may "become serious *impediments* to fuller and more correct understandings" (Spiro et al 1989:498), as they fail to serve the need to complexify the students' understandings of the workings of the human body. Most problems with metaphor seem to arise through reliance on just one analogy, that is useful initially, but which is too simple or inaccurate to allow for the complex understandings required for more advanced study. The power of the original analogy for the individual is such that it is not easily jettisoned or replaced. Metaphor may contribute negatively to cognitive change by

- providing a false sense of understanding and thus disallowing access to alternative structures
- providing concept domain structuring that is too simple or partial
- leading to inappropriate transfers of attributes or relations

(based on Spiro et al 1989).

Spiro et al. note that a further cause of problems can be the use of everyday language terms in technical discourses, transferred via analogy, but with their everyday meanings and / or connotations transferred inappropriately.

Spiro et al. suggest that there are several sources of misleading but "seductive" analogies:

- simplified metaphors from teachers or textbooks
- teachers or textbooks own misconceptions
- learners' own metaphors

(Spiro et al 1989:510)

As we saw in Chapter 5, the teachers seemed to use overly-simple metaphors in mathematics and in talking about literacy events. In both contexts, this might be due to

the teacher's own lack of confidence with, or lack of complexified knowledge of, the Topic domain.

The solution proposed by Spiro et al for over-reliance on too simple a metaphor is to

combat the power of a limited analogy with *another powerful analogy* that counteracts the limitations of the earlier one. (Spiro et al. 1989: 514)

It is recommended that instruction make use of integrated multiple analogies (or metaphors) which have been specifically chosen to correct the negative aspects of the original analogy, along with explicit discussion about the shortcomings of each, including the original. This strategy will require of the teacher or text-book writer an awareness of the limitations of basic metaphors and analogies. In the Volcanoes extract, it is interesting to note that the teacher did use multiple metaphors, and did explicitly discuss the relevant mappings of attributes and relations. It would seem important too, in the light of Spiro et al's findings, that when learners themselves offer an alternative metaphor / analogy, as happened with *wax*, this should be taken up, elaborated and examined for relevant links and limitations. A metaphor / analogy produced by a learner may be very powerful for that learner, and thus needs sensitive attention if misunderstanding through metaphor is to be minimised. The teacher in the Geology lesson in fact gave only minimal feedback on the pupil's proffered metaphor, and did not negotiate its appropriacy in detail.

(5) *For educational discourse, mediation in interaction between teacher / expert and pupil / novice is likely to be important for the successful understanding of metaphor.*

Types of mediation include:

- . making (more) explicit the relevant links between given Topic and Vehicle*
- . sharing and jointly refining metaphors around a given Topic*

Taking a Vygotskian view of cognitive development as socially mediated would lead to the expectation that evidence of metaphor in effecting cognitive change might be seen interpersonally in advance of its internalisation and intrapersonal use (Vygotsky 1962). In other words, the construction of shared understanding of, or through, metaphor in discourse between with peers or with a teacher may be an important step on the way to the construction and restructuring of an individual child's own understanding. The negotiation of shared understandings towards group norms may make use of metaphor to negotiate understanding, as for example when one participant uses metaphor to link new knowledge to existing knowledge (Rogoff 1990), or may involve the negotiation of metaphors themselves (Roschelle 1992).

I now take forward the information gleaned on the uses and **limitations** of metaphor in cognitive change, and on children's developing competence in the production and understanding of metaphor, as the background for the second empirical study.

7.3 Investigation 2 - Children making sense of metaphor : Aims

Investigation 1 has revealed something of children's everyday classroom encounters with metaphorically used language. Investigation 2 leads on from this in attempting to uncover how children make sense of the metaphors they encounter. This investigation focuses on the **processing** of metaphor. It aims to find out:

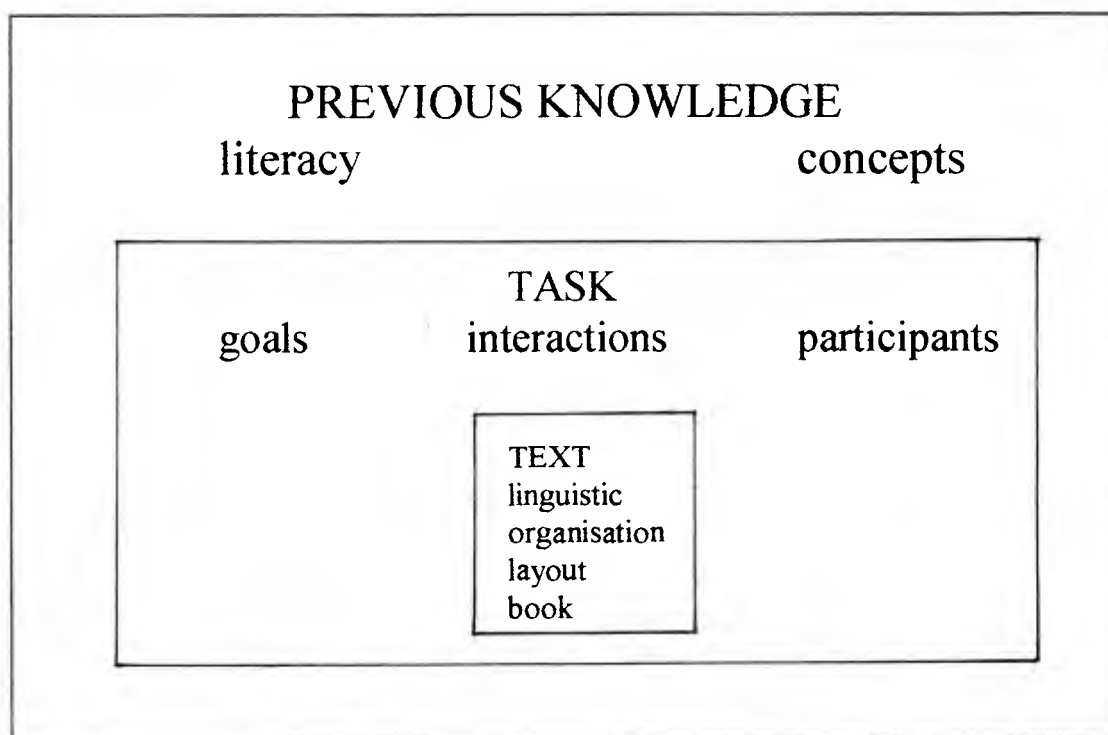
- how children construct an understanding of metaphor
- how learning can result from encounters with metaphor.

It takes a case study approach, using multiple sources of information about a small number of children (Robson 1994(b)); generalisations can thus only be made with caution.

The metaphors in Investigation 2 originate in **text** rather than in talk. The texts used in the investigation were selected as representative of the types of information books that children of 10 or 11 years find in their classrooms to provide supplementary knowledge on topics such as the environment and biology. Although the metaphors originate in written text, it would be unusual for a child to only encounter them in writing; such texts will be discussed with other children, read with the teacher, or brought into classroom discourse when the topics are raised in the course of lessons. The text is thus encountered within a discourse context that includes talk and interaction. The relationship of metaphor to its discourse context, first set out in Chapter 1, can be adapted for the metaphors of Investigation 2 by seeing the discourse context of text metaphors as several nested contexts. The text forms the immediate material and linguistic context, with metaphors embedded in phrases and sentences, that are in turn organised into chunks of text. These chunks are presented in particular layouts, combined on pages and double-page spreads with graphics, and making up the sequential order of a book. The next contextual layer outwards can be seen as "the use of the text", or the text within the context of a task. Key factors in this layer are the goals of the task, both the goals as planned and goals adopted by participants in action, and the interactions of participants. In broad terms, the motive of the text reading event can be seen as "making sense of the text". When examining interactional factors, power relations and previous interactional experiences will be relevant. The task and text layers can be further embedded within "previous knowledge", as the broadest discourse context

in which the metaphors are processed. Previous knowledge here refers to understandings and experiences that participants bring to the task and the text. It would include literacy knowledge linked to working with texts in various ways, and, more importantly for this thesis, subject knowledge relating to Topics and Vehicles of metaphors. The contextual layers are illustrated in Figure 7.1:

Figure 7.1 Metaphor in text: layers of discourse context



In order to carry out the first research aim, investigating the processing of metaphor in order to understand it, a research task was designed that created a discourse context representative of the everyday interactions of Figure 7.1. The basic research tool of "Think Aloud" was adapted to fit with a prosaic approach to language use (Chapter 1, Section 1.5) through being goal-directed, and interactive. Interactions on the task were then made 'visible' in the Think Aloud protocols, and analysable. Two texts were used to provide some comparisons and contrasts, and to take account of any experimental effect of task unfamiliarity.

A key finding of Investigation 1 was that understanding of metaphor in classroom talk is supported in various ways through signalling and explication. Investigation 2 will show whether such discourse support for understanding is provided by texts, and / or in the talk about the texts. If it is, then information about the extent and nature of discourse support for metaphor may have useful implications for teachers and text-book writers.

The second research aim, of investigating how processing of metaphor may contribute to learning, will require assessment of previous conceptual knowledge brought to the text-reading task, and of changes in understanding motivated by the text and metaphor processing.

Investigation 2 aims to illuminate further aspects of metaphor in educational discourse through a detailed case study into the understanding of metaphors that occur in two particular texts, using multiple sources of evidence and qualitative analysis to illuminate processing and learning. The specific research questions addressed in Investigation 2 in respect of the two texts worked on by the children are as follows :

1. How are linguistic metaphors in the text processed? Is there evidence that the children process linguistic metaphors in the texts metaphorically?
2. How is previous knowledge of the Topic and Vehicle used in making sense of metaphor?
3. How do encounters with metaphor contribute to learning, positively or negatively?
4. How does metaphorical language assist recall of information?
5. What is the role of mediation and multiple use of metaphor, where offered, in reaching shared understanding? are there factors that appear to influence success in mediation?

7.4 Research design

The focal subject continues to be Louise (10;8). In this investigation, data was collected outside of lessons, with Louise working with another girl, Ellen, and as one member of a group of five children. The central part of the investigation uses an interactional variant of Think Aloud methodology (henceforth: ITA) to examine the processing of linguistic metaphors in the shared reading of general science texts. In order to assess any learning that resulted from the shared reading, the children talked with the researcher and peers before and after reading in guided discussions of relevant concepts. Between reading the first and second text, the children received some instruction on "metaphor", including explicit use of the term and the discussion of examples in various classroom materials. The data collection procedures with the two texts differed slightly as a result of various constraints imposed by working in the real-life context of the school. An overview of the three stages of data collection and analysis around each Think Aloud task are set out in Table 7.1 below.

Table 7.1 Overview of research design for Investigation 2

	<i>Stage 1</i>	<i>Stage 2</i>	<i>Stage 3</i>
<i>What was investigated</i>	Understanding before reading / previous knowledge	Reading and making sense of text which uses metaphor. Metaphor processing	Understanding after reading. Change in understanding.
<i>Context for Data Collection</i>	Guided discussion on key concepts	Interactive Think Aloud task	Immediate recall through guided discussion. Delayed discussion.
<i>Data Analysis</i>	Analysis of content of talk	Analysis of ITA protocols	Analysis of content of talk

The methodology of Study 2 thus allows children's voices to have a place in research into understanding of metaphor (Chapter 2, Section 2.5), but the task design did not ask the children for direct explication of linguistic metaphor. The use of explication of metaphor has been shown to underestimate comprehension skills, since explication through paraphrase is a late developing skill, not fully developed until around 11 years (Pollio and Pickens 1980). In this investigation, explicit talk about the meaning of metaphorical language took place in interactional situations, in which an individual child's output could be mediated by peers or an adult.

I now describe data collection and analysis procedures in more detail, and discuss issues of validity.

7.5 The participants

Ellen, who took part in the Interactive Think Aloud tasks, was slightly younger than Louise at 9;11, but quite similar in terms of socio-economic class, family structure (two parent, siblings), and level of achievement at school.

In the group discussions, Ellen and Louise were joined by three other children from their class:

Heather (10;7)

Marie (11;5)

Duncan (10;1)

Marie was the oldest pupil in the school, and had been at the school a year longer than Ellen and Louise. She was clever and well-read, although quiet in discussion. Marie and Heather came from more 'intellectual' families than the others (Head teacher's

information to researcher), and this perhaps contributed to the quality of their contributions to group discussion (Snow 1996). Duncan did not especially shine in class work, especially written work, although he did sometimes perform well orally in the recordings. He had a tendency to 'play the clown', both in class and in the investigation, by picking up comments he found amusing, and repeating or exploiting them.

7.6 Data collection schedule

The second investigation began on the sixth visit to the school, by which time the subjects were used to the researcher and to being recorded. Data was collected on 3 further visits as per the following timetable:

Week 1	Discussion of the ozone layer ITA task on text "The Ozone Layer"	Louise, Ellen and Researcher "
Week 2	L. and E. report to 3 others about the ozone layer Introduction of "metaphor" Exploration of metaphors in texts	Group " "
Week 3	Report back on metaphors collected Further exploration of metaphors in texts	Group "
Week 5	Report back on metaphors collected Discussion around "pumps" ITA task on text "The Heart"	Group " Louise, Ellen and Researcher

The data analysed and reported here was collected in Weeks 1, 3 and 5 of the investigation.

7.7 The texts

The two texts used for the Interactive Think Aloud tasks were taken from the books "The Ozone Layer" (Bright 1991) and "The Body and how it works" (Parker 1987), and can be found in Appendix 4. They were selected as recent information books aimed at children of this age range, on general science topics that the children were likely to have encountered, but which include complex concepts and so had potential for further learning. Both texts contained metaphorical use of language.

The text selected from "The Ozone Layer" comprised the first 3 pages of the book, a single page followed by a double-page spread; each page was illustrated. From the other book, a text on "The Heart" was selected which was one part of a double page spread that included a diagram and labels. The two texts were of similar length.

While similar in many respects, the texts also provided contrasts in the demands they presented to the children. The Heart text proved problematic to make sense of because

of its reliance on knowledge of the complex underlying metaphor of the heart as a pump, whereas the text structure of the Ozone Layer presented particular problems of reference across the surface of the text. The use of the two texts thus provided a range of problems for the children to deal with in reaching an understanding of linguistic metaphors in their discourse context.

7.8 Data analysis: Identification of linguistic metaphors

Identification of linguistic metaphors was carried out using the identification procedures established in Chapter 2 and used in Investigation 1. Inter-rater reliability was checked by presenting the texts to adults on UK Masters' courses (Text 1, N=25; Text 2, N=17) who had been exposed to the researcher's criteria for metaphor, and who were asked to underline metaphors. Any disagreements were carefully examined to reach a final decision on what was to count as the set of linguistic metaphors in each text.

7.9 Data analysis: Analysis of linguistic metaphors

7.9.1 Frequency, form and features

The metaphors were analysed in terms of their frequency, and their linguistic form. From the revised set of graded features (Chapter 6, Table 6.5), a sub-set were selected as being particularly relevant to assess for this study. These were: incongruity, novelty / conventionality, attitudinal impact, cognitive demand and systematicity. Explication and explicitness of metaphorical intention, which had emerged as an important feature of metaphor in spoken discourse, are dealt with separately as "discourse support for understanding".

7.9.2 Linguistic metaphors in text structure

The two texts used were analysed for their information structure, the propositional knowledge encoded in the texts, and the role of linguistic metaphor in the discourse and information structure. In writing scientific information texts, the authors presumably intended stable interpretations to be reached, rather than polyvalent, open-ended readings that might be expected of a more literary text. Although, the intended reader was presumably a child, the text analyses reveal what an idealised skilled adult reader might be expected to understand from reading the texts, and the work required to access that understanding from the information as presented. This serves as a basis against which to compare the children's reading.

7.9.3 Discourse support for understanding of metaphors

The analysis of metaphor in talk in Investigation 1 produced a set of ways in which metaphor use is signalled and in which metaphor understanding appears to be assisted (Chapter 6, Sections 6.3.4 and 6.3.5). The texts and text structures were examined for evidence of similar features that might offer written discourse support for understanding.

7.10 Data collection and analysis: pre- and post- understandings of key concepts

7.10.1 Group discussion procedures

The main research aim of the pre-ITA group discussions was to elicit information about the children's existing knowledge of the various concepts encountered in the texts, such as the nature and function of the ozone layer and the pumping of the heart. For the Ozone Layer text, this was done by the researcher asking Ellen and Louise where they had heard about the topic and what they knew. Initial statements were followed up with questions requesting clarification, until information seemed to be exhausted. The pre-ITA discussion for the Heart text, carried out with the larger group, started from the concept of *pumping*, which the children in discussion themselves linked to the heart. The protocols show that these pre-ITA discussions activated ideas that were used in the processing of the texts, and, as such, they function in a similar way to a teacher-led introduction to a topic before presenting new information (c.f. the Geology Lesson in Investigation 1).

Post-reading knowledge was checked immediately after reading, when Louise and Ellen discussed the content of the text with the researcher. The Ozone Layer text was further reviewed a week later, when the two children were asked to tell their peers what they had found out. The Heart text was only reviewed immediately after reading because the data collection period had then finished. While exactly parallel methodology for the two texts would have been preferable, the in-depth, qualitative nature of the analysis means that useful information was obtained from all sessions. Care is taken in the analysis to ensure that contrasts are only made across data obtained within each session, i.e. between individual children, or between metaphor types, or, if made across sessions, are only made between parallel parts of those sessions i.e. the two ITA sessions carried out by the same children.

The researcher played a role in the discussions that was directive, in terms of the topic of the talk, but tried not to be overtly instructional, and avoided giving information, being more concerned with eliciting the children's knowledge in as much detail as possible, and with checking understanding (see 7.14 below).

7.10.2 Analysis of discussions to establish previous knowledge

The discussions with the researcher and / or other children, that took place before ITA reading of the texts, were recorded and transcribed. Investigation of existing understandings was carried out through column analysis of the transcriptions, in which the contributions of individuals are placed in separate columns, with the interactional sequence retained left to right and vertically (see Extract 18 below). Since the focus in this analysis is on ideational content, pauses and other non-fluency features are mostly omitted. Analysis of ideational content was carried out by working vertically through the columns of individual children. The effects of interaction on ideas and concept activation, e.g. how mention of one idea might prompt a further contribution, was examined by considering the data across columns. A brief example from the pre-ITA discussion for the Ozone Layer text is given in Extract 18 below. In order to follow the interaction, the reader should read across columns from left to right, and then move down to the next horizontal line. Turns are numbered to help the reader follow the sequence. By comparing pupils' existing knowledge as displayed in the discussion with the information contained in the text, it was possible to estimate the potential of a text for contributing to learning, i.e. to add to or change existing knowledge.

Extract 18 From the pre-ITA discussion on "The Ozone Layer" (Tape 8: 6 - 30)

Researcher's question	Louise's response	Ellen's response
(1) <i>what do you know about the ozone layer ? have you heard about it?</i>	(2) I've heard about it cos I sometimes watch the news	(3) heard about it a lot on the news and green programmes but we haven't learnt
	(4) BBC1... Newsround	(5) Blue Peter
	(6) ... might be some books	(7) Blue Peter
(8) <i>so what have you picked up from listening to all those? where is it? what is it?</i>	(9) it's a big hole erm	(10) a big protective thing protecting the earth from the sun
	(11) something to do with the.. hard to describe	
(12) <i>it's a protective thing..you said something about a hole</i>		(13) yea it's got a hole in it
(14) <i>how did it get this hole in it?</i>	(15) is it from the sun's rays?	
(16) <i>uh ha</i>		(17) greenhouse effect and everything

7.10.3 Analysis of post-Think Aloud data

A column analysis was carried out on the transcript of the discussion which took place one week after reading the first text to identify evidence of positive or negative contribution to longer term cognitive change. The analysis looked for evidence of recall of ideas in the text and / or the linguistic metaphor used to carry them, and for evidence of weak or strong restructuring of concepts. Examples of recall and restructuring were checked against the original text content for accuracy and completeness.

The post-ITA data was not as extensive as wished in respect of the second text. Nonetheless, the brief post-ITA discussion yielded some useful spontaneous statements about what had been learned, and these are used as suggestive evidence.

7.10.4 Limitations of data collection and analysis

Such a methodology of data collection and analysis can clearly not claim to produce a full picture of a child's conceptual knowledge. It is claimed, however, that information that "comes to mind" and is articulated for others in this type of informal but directed discussion is likely to overlap significantly with the information that is used in interpreting written text.

7.11 Data collection from Think Aloud tasks

Steen (1992) made use of concurrent sentence-by-sentence Think Aloud (TA) tasks with individual adults to explore their understanding of metaphor in literary discourse, and this study follows his methodology quite closely, with several adaptations made to take account of the age of the subjects.

- ~ The first major adaptation was to turn the Thinking Aloud from an individual to an interactive task. In a trial TA exercise with an individual child of 11 years (about the same age as Louise), it was immediately obvious that solo verbalised introspection does not come easily to children. The recordings made in the classroom had captured Louise and her best friend Ellen talking to each other throughout the day about the content of lessons and organisational matters, and so it was decided that the two girls should work together on the TA tasks. This "Interactive Thinking Aloud" (ITA) proved much more productive. It also changed the nature of the research task, and thus the requirements for construct validity.

- ~ The second adaptation was to construct an explicit, participant oriented (i.e. non-research), goal for the reading task. In most TA studies, the goal given to participants is to report their "thoughts" as they read a text (Stratman and Hamp-

Lyons 1994: 89). Since this task is unfamiliar to most participants, it raises important issues of task validity. The girls in this investigation were asked, in child-friendly terms (see Extract 19), to read the text and evaluate its suitability for a child slightly younger than themselves. This goal drew their attention to the comprehensibility of the text, while allowing them to distance themselves from any problems they might encounter. The type of research methodology developed is, from this point on, labelled "Goal-directed Interactive Think Aloud" (GITA).

7.12 Validity in Goal-directed Interactive Think Aloud tasks (GITA)

TA methodology has been widely used to investigate text processing by adults, and, as such, much work has been required to establish its validity (e.g. Ericsson 1988; Ericsson and Simon 1984). Validation has had to address the key issue that thinking aloud alters the very cognitive processes it sets out to investigate, by, for example, slowing down the reading process, and by imposing tasks on readers through the experimenter's instructions. Ericsson and Simon (1984) produce convincing evidence to show that cognitive processes are not substantially altered, and that TA can provide valid evidence of text comprehension processes. However, Ericsson and Simon's work is embedded in an Information-Processing (I-P) framework, which, for this study, and perhaps for the study of metaphor and language in use generally, has two key limitations. First, in an I-P framework, cognitive processes are seen as individual processes, with no allowance made for interaction or mediation by others; secondly, the content of such processes is seen as information when, as Rose (1993) points out, human brains work with meaning. I argue that GITA as a research method replicates aspects of children's normal classroom action fairly closely, and through this has construct validity. In GITA, the concern is not so much with text comprehension processes, as with searching for meaning processes, reflecting a view of human cognition as centred around "an innate drive for 'coherence' and a high level cognitive mechanism for producing it" (Meadows 1993:72). The cognitive processes involved in this 'making sense' are seen as the coherent integration of new information from the text, some of which is encoded in metaphorical language, with previous knowledge. The interactive nature of GITA, with peer collaboration and some adult mediation from the researcher, reflects normal discourse-embedded cognitive processes in which inter-personal meanings may pre-date intra-personal meanings, and in which thought is seen as internalised talk (Vygotsky 1962). Moreover, children at the end of primary school have learnt to read through reading aloud, and still read aloud regularly in class, so that there is no need to deal with the issue of whether reading aloud slows down normal silent reading processes of fluent adults; reading aloud to another person is a normal reading process for the children. Ericsson and Simon (1984) stress

that fluent reading of easy texts produces very little in the way of TA protocols, and that texts that present some difficulties to subjects are likely to be more informative to the researcher. Again, texts that present difficulties are probably the norm for children, rather than an exception contrived for the purposes of research; children daily encounter texts that present difficulties in decoding or in content complexity. The present study attempted to avoid decoding problems, but to incorporate potentially difficult (but not too difficult) content matter.

Two process aspects of the GITA methodology remain of concern for construct validity, both relating to the units of processing normally adopted as compared with that imposed by the research methodology. The first relates to how children attack a page of information in a book; the second to how they attack a chunk of text. I take each in turn. In the first case, it became clear after the first GITA session that sentence by sentence reading was not the primary way in which the children would normally attack a page of information in information books of the type used in the investigation. The books made frequent use of a double page spread with a large print heading, and chunks of text integrated with graphics (pictures or diagrams), and their labels. When presented with such a page, the children first scanned it for easily accessed information, then settled on a particular chunk to read, usually the labels on the diagram. With that information on board, they might then attack the larger chunk of text. The GITA task of sentence by sentence reading of a large chunk of text thus replicates a later stage of reading. In bypassing the preliminary stages, in which useful information might have been added to, or activated in, previous knowledge, the children were perhaps put under abnormal strain. However, while admitting that this might be the case, I would argue that the processes revealed under these pressures are still of considerable interest, and do reflect what a child might do when faced with a difficult text. The GITA methodology could be further validated by comparing outcomes with full and restricted texts.

The second issue concerns the GITA-generated effect of distancing sentences from each other in the reading process through concurrent sentence-by-sentence reporting. The resultant splitting-up of the text might affect the understanding of cohesive links, such as anaphoric reference, or recall of links between concepts. Mitigation of this was attempted through the presentation of the sentence to be processed and reported on accompanied by the previously read text, as it would have appeared in the original chunk (page or section). Examination of protocols shows that problems with reference did occur, but were more likely to be associated with ambiguity created by the text structure.

The concurrent sentence-by-sentence verbal interaction was used to shed light on the role of metaphor in the social and cognitive processes of reaching shared understandings. Analysis of the children's strategies and comparison with those of adults in Steen's study (1992) and in studies reported by Ericsson and Simon (1984) allow some cross-checking of validity, in addition to the above arguments for construct validity. Preliminary task analysis, in terms of the role of the metaphorical language in the information content and discourse organisation of the text, also contributes towards establishing validity of the categorisation of utterances in the protocols (Ericsson and Simon 1984:321).

7.13 GITA procedures

The texts were prepared for sentence-by-sentence processing by photocopying and blanking out sentences, so that the subjects were presented with a succession of separate pages on which they found the text already read, together with the new sentence, highlighted. The Ozone text covered 18 pages, and the Heart text 17 pages. Before reading the first text the instructions in Extract 19 were given, and immediately before beginning the task, those in Extract 20:

Extract 19 Pre-GITA instructions given by researcher to participants

R: what we're going to do today is look at some (.) language on paper (.) some writing (.) right (.) um (2.0) and it's about the ozone layer (1.0) I don't know what you know about the ozone layer but I've got a little boy (.) who's (.) eight (.) well he's just nine but he's eight and he's not terribly good at reading you see (.) but he wants to know about the ozone layer (.) so I found a book (.) and I want you to help me to decide if you think (.) it will work for him (1.0) right (.) so he's just a bit younger than you (1.0) (Tape 8:1-7)

Extract 20 Pre-GITA instructions given by researcher to participants as task begins

R: right (.) now (.) with the work that I'm doing (.) you see that would help me very much to know things like that (.) to know (.) what what it's like when you're reading it (.) I know what it's like when I'm reading it (.) but I don't know what it's like when (.) someone your age is reading it (.) so if you can (.) if you can explain all those things (.) that would be very helpful you see (1.0) so (.) I'll show you there's quite a few pages to look at (.) (getting out pages) I've photocopied the book (.) I'll show you the book later (.) that's the front page (.) The Ozone Layer (.)

.....
so the idea is (.) you take these pages one at a time (2.0)
right and (.) what I've done is (.) on each page you get one bit extra from the page before (.) and the extra bits have been highlighted in pink (.) okay so (.) that's the bit you're going to look at and (.) you're going to talk about it together (.) to make sure you understand it (.) and tell me anything that would help children understand it or anything that would (.) stop them understanding it (.)

L: right (Tape 8: 92-108)

The contextualisation of the task as 'reading to check the suitability of the text for a younger child' appeared to be convincing, and was used by Ellen in her evaluation of the book at the end of the session. A week later, she explained their task to the other children as:

Extract 21 Ellen explains the GITA task to peers

E: we er had to look through a book and we had to look at certain sentences in the book and tell whether they were explained well or not ...

we had to tell whether it was explained or whether the book would be good for a child
(Tape 9: 4 - 5, 10)

The second GITA session with the Heart text had no explicit instructions other than "just like we did it before" (Tape 11: 3).

The data was collected with a portable tape recorder. It was transcribed by the researcher and a sample transcription can be found in Appendix 5. The transcription aims to capture a middle level of detail, including pausing, overlaps and interruptions, but does not attempt to reflect segmental or supra-segmental features of phonology unless relevant to the collaborative search for coherence: for example, stress or intonation that indicated disagreement or surprise. Transcribing conventions are as for Investigation 1.

7.14 The role of the researcher in GITA

In setting up the research task with the child participants, it was clear that some intervention from the researcher would be inevitable, but that, if the discourse context of the research task resembled a regular adult - children context, the validity of the data collected might be increased rather than reduced. Analysis of the adult contribution to the talk on GITA shows the following:

Number of turns: the children had twice as many turns as the adult on Text 1, and more than three times as many on Text 2. The difference was largely due to initial unfamiliarity with the GITA task and the need for prompting.

Types of turns: Four major functional types of intervention could be identified in the adult's talk, with most of the adult turns having function 4.:

1. Evaluation Prompt

any words that you think would be difficult for someone? (.) say an eight year old was reading it? (Tape 8: 251-252)

2. Understanding Check

- what's the link between the gases and the liquid?* (Tape 8: 162)
3. Direct Understanding Support
have they mentioned something already that's harmful to life? (Tape 8: 402)
4. Task Management
okay (.) let's see what else he has to say (Tape 8: 197)

The occurrences of each type of intervention for each text are given in Table 7.2 below. The figures represent the number of each type of intervention as a percentage of the total number of adult turns in the protocols for that text. (Note: The sum of column 1 fails to total 100 because of rounding up / down carried out for each type.)

Table 7.2 Occurrences of different types of intervention in adult's talk in ITA

Type of turn	The Ozone Layer	The Heart
1. Evaluation Prompt	16 %	7 %
2. Understanding Check	31 %	42 %
3. Direct Understanding Support	9 %	15 %
4. Task Management	45 %	36 %
	101 %	100 %

Type 1 intervention, reminding the participants about the goal of the task to evaluate the clarity of the writer's language, dropped dramatically for Text 2, when the children were much more tuned in to the task. It in fact fell fairly quickly after the first few sentences of Text 1. The most frequent type of talk by the adult was Task Management, and the majority of those turns were minimal supportive responses, usually *mmhm*. The role of the adult in the GITA can be seen to be mainly that of keeping the talk going (Rows 1, 3 and 4) with a supplementary role of checking the children's understanding of the words and concepts introduced by the texts. Sometimes a single checking incident took several turns, and sometimes it was disguised, for example by asking one girl to explain to the other. The comprehension problems presented by the second text required some direct intervention through mediation of understanding, with resulting higher totals for 2 and 3.

In assessing the validity of adult intervention in GITA, it must be recalled that GITA data is not claimed to be evidence of reading comprehension processes, but of interactive searching for meaning processes. Checking understanding is well established as an aspect of negotiation of meaning (Long 1983), and in educational expert-novice discourse is likely to play a key role in targeting additional explanation accurately. In addition, the GITA data is not to be used for quantitative analysis across subjects and texts, but for in-depth qualitative analysis of the development of understanding, and therefore the information provided by the Understanding Checks was very important.

7.15 Analysis of GITA protocols

The transcribed protocols were used to analyse metaphor processing and text processing, under the GITA conditions. Protocol analysis of sentences containing linguistic metaphor involved the categorisation of stretches of talk for a Topic- or Vehicle- related function in moving towards a jointly agreed understanding of the sentence, and made use of Steen's (1992) categorisation system. The system (explained below in further detail) allowed the role of previous knowledge to be made clear. The girls' joint interpretation of a metaphor, as agreed at the end of a sentence protocol, was examined for its accuracy, relative to the writer's (assumed) intended interpretation, and for its richness, in terms of the complexity and number of the Topic-Vehicle links. As suggested in Section 2 (above), comprehension is not a closed process with a clear end point; there may be a minimal level of making sense, but beyond that individuals may access further understandings out of the potential richness of the metaphor. This process is creative, an example of Bakhtin's "unfinalizability" (Morson and Emerson 1990:36). The GITA protocols demonstrate the creativity that participants brought to their reading of this text.

Working across protocols, I also traced the contribution of linguistic metaphors and underlying metaphors to the process of making sense of the text as a whole. Protocols of sentences that presented problems of interpretation were analysed in some detail. These problems were identified by instances, or combinations, of:

- a direct request from the participants for clarification of part of the text
e.g. *what has four chambers?* (Tape 11-3:71)
- explicit statement of doubt or disagreement
e.g. *I thought gases were meant to be harmful* (Tape 8: 200)
- a response to a question from the researcher that demonstrated problems in understanding
e.g. *do you know what hormones are? no* (Tape 11-3: 294-5)
- explicit negative evaluation
e.g. *it's very hard to understand for even us* (Tape 8: 625)

The textual or conceptual sources of the problems were then identified, using information in the protocol and from the pre-GITA discussion. Strategies used to try to overcome the difficulties were extracted from the protocols in order to illuminate how the girls made use of their language skills, their previous knowledge and their reasoning skills. Breakdowns in comprehension provided very useful information about the constraints of metaphor in carrying ideational content. In one particular episode, the

researcher intervened to mediate the meaning of a sentence, and this is analysed in detail as an example of successful mediation of metaphor.

7.15.1 Categories of metaphor processing

In categorising processes in making sense of metaphors from the protocols, I drew on Steen's work with adult readers (Steen 1992), refined in the light of results of Investigation 1 (Chapter 6, Section 6.5.1). Steen set up a 10-category system for protocol analysis of metaphor processing (1992:251). The 10 categories related to basic processes of metaphor identification, metaphor processing and metaphor appreciation. The GITA protocols revealed that these three basic processes were observable in the children's talk, and that some of Steen's sub-categories could be mapped on to the GITA protocols. No explicit identification of metaphor occurred, although before reading the second text, the children had encountered the metalinguistic label "metaphor". Some noticing of anomaly was evidenced. Steen's "Metaphor Refunctionalisation", which categorises reference to metaphors used previously in the text, was re-labelled "Metaphor Reference"

An additional process seemed to be present, in which the children made explicit links between their own knowledge or experience and the Vehicle term of a text metaphor. For example, when discussing the metaphor *the atmosphere is a blanket of gases*, Louise produced

when you're in bed you've got a blanket sort of protecting you from the cold
(Tape 8: 218)

This type of utterance was labelled "Vehicle Contextualisation" to link with the teacher's use of personal experience in the classroom discourse (5.13.1). Contextualisation was observed in analysis of the Lollipop Trees episode (Extract 13) and of the Volcanic Lava episode (Extract 16). It may be an important support for understanding of metaphor.

Steen's category of "Vehicle Construction" was re-labelled "Vehicle Development" and sub-divided to take account of the processes discovered in Investigation 1 (Chapter 5, Table 5.10) by which metaphor Vehicles are explicated and elaborated within Metaphor Framing Episodes. Topic Development could also have been broken down in this way, but there are insufficient instances to warrant this. Contextualisation was distinguished from Development through the combination of lexical content and pronominal reference (use of *you your*). The final categorisation system used in the protocol analysis is given in Table 7.3, illustrated with examples from the data.

Table 7.3 Categorisation system for metaphor processing used in GITA protocol analysis

Metaphor Processing Categories	
1. Evaluation of use of metaphor	
The subjects express an opinion as to the value of using a metaphor.	
<i>it's quite a good way of putting it</i>	(Tape 8: 214)
<i>it's helping us understand</i>	(Tape 8: 217)
2. Restatement of metaphor	
The metaphorical piece of language is restated immediately after the first reading, using the Topic and Vehicle terms, together with metalanguage indicating a restatement	
<i>is sort of like saying it's like a blanket</i>	(Tape 8: 209-210)
<i>that's telling you about the atmosphere and the shield of air surrounding the earth (.)</i>	
<i>it's like a shield</i>	(Tape 8: 458-9)
3. Vehicle Development	
The Vehicle term is developed in several ways:	
3.1 Vehicle Explication	
expansion, elaboration or exemplification of Vehicle term, involving a shift in level of generality	
<i>that protects it</i>	(Tape 8: 210)
<i>a good type of gas</i>	(Tape 8: 211)
<i>invisible (.) no-one can really see it</i>	(Tape 8: 460)
3.2 Repetition	
Vehicle term is repeated in identical or transformed form	
<i>a blanket round our earth</i>	(Tape 8: 212)
<i>so shields and blankets</i>	(Tape 8: 473)
3.3 Relexicalisation	
A near synonym or equivalent of the Vehicle term is used, working at the same level of generality	
<i>squeeze....more like pump blood out</i>	(Tape 11: 103)
4. Vehicle Contextualisation	
The Vehicle term is related to something outside the text, in participants' knowledge or experience	
<i>when you're in bed you've got a blanket sort of protecting you from the cold</i>	(Tape 8: 218)
5. Topic Development	
Additional information (from elsewhere in the text or from previous knowledge) about the Topic domain is stated	
<i>blood ..to take it to your arms and fingers and things</i>	(Tape 11: 28)
<i>it's a body</i>	(Tape 11: 47)
6. Metaphor Construction	
The Topic term is re-juxtaposed with the developed or contextualised Vehicle term to reformulate the metaphor	
<i>and then there's another type of blanket which is of gases surrounds the earth</i>	(Tape 8: 220)
7. Metaphor Reference	
A reference to a metaphor encountered previously in the text	
<i>he's already said something like that when he was on about (.) the blanket</i>	(Tape 8: 480)

The categorisation system was used on the protocol of each sentence, and proved useful in contrasting the processing of nominal and verb linguistic metaphors, and also in the identification and description of possible process metaphors, including those not

originally identified as linguistic metaphor. The similarity between the children's observed processes in GITA, and those found in Steen's adult subjects, suggests that the categories have validity as reflecting human mental processing of language in text.

7.15.2 Example of protocol analysis using the categorisation system

I now take an extract from the transcription of the reading of the Ozone Layer text to show how the categorisation system was applied. In Extract 22, the girls work on a sentence containing a linguistic metaphor:

Extract 22 From the GITA protocol for "The Ozone Layer" Sentence 14

The atmosphere is like an invisible shield of air surrounding the Earth.		PAGE 14 (318)
1	L: (reads) the atmosphere is like an invisible shield of (.) air surrounding the earth (.) that's telling you about (1.0) the atmosphere (.) and (.) the shield of air surrounding the earth (.) it's like a shield protecting the (.)	
	E: but it's invisible (.) nobody can really see it	
5	A: do you remember what he said the atmosphere was like before? (2.0) at the beginning of the book? (2.0)	
	L: oh	
	E: I can't remember	
	A: you said it was a good (.) a good (.) word that he used (.) it reminded you of when you	
10	went to bed (1.0)	
	L: a blanket	
	E: a blanket	
	L: he he's talking about it was a shield (.) ?????? a layer like a blanket and now he's talking about it as a (.) invisible shield	
15	E: an invisible shield	
	A: mm	
	E: so shields and blanket (laugh) (3.0)	
	L: that is quite a good way of putting it though	
	E: protecting (.) cos shields protect you when you're having (.) a war or something (.) and	
20	then (1.0) a shield protects you	
	L: yea	
	protects you (.) and also a shield (.) is protecting (.) the air surrounding the earth (6.0)	
		(Tape 8: 457-478)

The extract is now presented again, but with the categorisation of utterances made according to the system in Table 7.3. At this point, this particular protocol analysis serves to show how the categorisation system was applied to the transcribed talk. The researcher's interventions appear in brackets, labelled according to the system in Table 7.3. The unit of analysis (one row in the left hand column) is not defined by length, turn or speaker, but by content and syntactic completeness, with boundaries placed to coincide with the start of a new clause and a shift in topic (sometimes clauses are not completed) and pauses.

understanding of the language used metaphorically. The accuracy and richness of the understanding produced in the protocol can then be compared with the writer's assumed intentions when employing the metaphor. Comparison with pre-GITA knowledge will indicate whether the metaphor has initiated any cognitive change, which can in turn be compared with knowledge displayed in post-GITA discussions to indicate the contribution of the metaphor to learning. Care has been taken not to make unwarranted claims about individual understanding from the jointly constructed content of the interaction; individual knowledge or understanding is only inferred from individual statements.

7.16 Conclusion

In this chapter, I have summarised the data collection and analysis procedures for the different stages of Investigation 2. A new adaptation of Think Aloud, Goal-directed Interactional Think Aloud, has been developed for use with children of late primary age, and its validity for the investigation discussed. A categorisation system for use in GITA protocol analysis has been presented and exemplified.

I move in the next chapter to present the results of the various analyses, taking each text in turn, and then discussing the results across the two texts.

CHAPTER 8

EMPIRICAL INVESTIGATION 2 - CHILDREN MAKING SENSE OF METAPHOR RESULTS (TEXT 1 - THE OZONE LAYER)

8.1 Introduction

The results of Investigation 1 will be reported in two stages, taking each text in turn. For each text, I first analyse the linguistic metaphors and their role in the text structure, and then report findings about the knowledge with which the children approached the text. The results of the goal-directed interactive think-aloud task are then reported, showing how the linguistic metaphors were processed, and the nature of the understanding reached. As well as reporting the sentence by sentence results, I also report the understanding of the whole text reached by the children. Finally, I report any changes in understanding that appear to result from reading the text, and discuss the results in terms of the research questions. Text 1 results are reported in this chapter, with Text 2 results and a full discussion of Investigation 2 in the following chapter.

8.2 Linguistic metaphors in the text

The linguistic metaphors in each text were first identified and the identification cross-checked. They were then classified according to their linguistic form (Chapter 3, Section 3.6), and a subset of graded features (Chapter 7, Section 7.9.1).

8.2.1 Identification of linguistic metaphors

The stretches of language in Table 8.1 were identified as linguistic metaphor by the researcher, working with the identification procedures set up in Chapter 3, and used in Investigation 1.

Table 8.1 Linguistic metaphors identified in "The Ozone Layer" by the researcher

sentence	
2	harmful gases can escape into the atmosphere
3	The atmosphere is the blanket of gases that ...
5	ozone, a gas which protects us from the Sun's harmful rays
6	the Sun and the atmosphere make life on Earth possible
7	The Earth is kept warm
7	the atmosphere traps some of this heat
7	so that it doesn't escape into space
8	not all the energy made by the sun
10	The atmosphere is like an invisible shield of air
11	gases which protect life
12	The atmosphere lets useful energy through
14	This (= ozone layer) stops some of the harmful UV light getting to Earth

Not counted as metaphor, but on the borderline were **harmful**, which pre-modifies radiation, energy, and gases, and its contrasting term **useful** (energy). Both seem to suggest some sort of personification, but not sufficiently to be counted as metaphor.

Inter-rater reliability of metaphor identification

The text was presented to 3 groups of adults, containing a mix of native speakers and non-native speakers, N = 25. The adults were post-graduate TESOL students at British universities, and had received the author's definition and explanation of metaphor shortly before being asked to identify metaphors by underlining them in the texts. Only complete responses were used, and metaphors identified by fewer than 4 subjects are discounted. For the purposes of this study, total figures across native and non-native speakers are used.

The results are summarised in Table 8.2. Column 1 shows the words that were underlined by respondents. Columns 2 and 3 show how many of the respondents underlined a particular word or phrase, as a raw figure and as a percentage of the total number of respondents.

Table 8.2 Linguistic metaphors identified in "The Ozone Layer" by adult subjects

Linguistic metaphors underlined	Number of subjects identifying this as metaphor [N=25]	%
3. the atmosphere is <u>the blanket</u> of gases	25	100
10. the atmosphere is like <u>an invisible shield</u> of air	25	100
7. the atmosphere <u>traps</u>	21	84
7. it doesn't <u>escape</u>	16	64
12. atmosphere <u>lets...through</u>	7	28
11. gases... <u>protect</u>	5	20
7. Earth is <u>kept warm</u>	5	20
2. gases can <u>escape</u>	5	20
5. a gas ... <u>protects</u>	4	16
12. <u>useful</u> energy	4	16

Of the 10 items identified as linguistic metaphor by the adults, 9 were also in my list of 12. **useful energy** was discounted. Three which I had included, but which are not in the above list, are **make life possible**, **energy made by the sun**, **stops**, which are borderline personifications. The 9 identified both by at least 4 adult subjects and myself are taken as the core linguistic metaphors of the text.

The gradedness of the results in Table 8.1 demonstrates the gradedness of metaphoricity for receivers, and the difficulty of being consistent in categorisation at the lower end. Such graded results could arise from the use by respondents of a weighted set of identificational criteria, i.e. some of the criteria carry more importance than others. Similar graded results would arise from identification through matching to prototype, or to a "typical" metaphor. Nominal Group metaphors, with 100% identification rates, seem, in this sense, to be operating as "typical" metaphors. The cline may also be seen as moving from "deliberate" to "emergent" metaphor (Chapter 6, Section 6.5.3).

A discourse effect may also be needed to account for the different rates of identification of the two verb metaphors that occur twice in the text: **escape**, **protect**. This may, as Low (in press) suggests, be due to features of layout, e.g. the position of the second instance of **escape** as immediately below **traps** may add to its noticeability. The second instance of **protect** may also be rendered more obvious by the large size sub-heading **Protecting Earth** which is just above it in the text. In both cases, the second instance may be made more noticeable by the cumulative effect on the reader of the text already processed.

The final set of linguistic metaphors in the Ozone Layer text is then as follows

Table 8.3 Final set of linguistic metaphors identified in the text "The Ozone Layer"

sentence	
2	harmful gases can escape into the atmosphere
3	The atmosphere is the blanket of gases that ...
5	ozone, a gas which protects us from the Sun's harmful rays
7	The Earth is kept warm
7	the atmosphere traps some of this heat
7	so that it doesn't escape into space
10	The atmosphere is like an invisible shield of air
11	gases which protect life
12	The atmosphere lets useful energy through

8.2.2 Density of linguistic metaphors

The occurrence of 9 linguistic metaphors in the text of 250 words can also be formulated as a density of 36 linguistic metaphors per 1000 words, more than twice as high as in the classroom talk, and more than three times as high as the figure reported by Evans and Gamble (1988) for school textbooks.

8.2.3 Form of the linguistic metaphors

The metaphors divide sharply into two grammatical types: 7 of the 9 have Vehicle terms that are Verbs or Verb Phrases, while the remaining 2 are Nominal Group metaphors, of the form *NP is NP of NP* (Chapter 3, Section 3.6.6):

The atmosphere is **the blanket** of gases that surrounds the Earth.
The atmosphere is like **an invisible shield** of air surrounding the Earth.

The second nominal metaphor is more "hedged" in Glucksberg and Keysar's terms (1993), in that it includes *like* and a pre-modifying adjective as metaphor-supporting information (Chapter 6, Section 6.5.1). The use of the definite article in the first sentence would seem to prohibit the addition of *like* to make a simile.

The *NP is NP of NP* structure nests the Vehicle term amongst Topic-related terms, in a way that may affect processing and understanding, through the amount and type of relevant information provided.

The verb metaphor Vehicles are, except for one, single lexical items, and are schematic, rather than the prepositional or phrasal, and often delexical, verbs found to be characteristic of classroom talk.

8.2.4 Graded features of the linguistic metaphors

As explained in Chapter 7, Section 7.9.1, a selection of graded features from Table 6.5 was used to describe the linguistic metaphors.

G 1 Incongruity

Each of the verb metaphors is justified as metaphor through the personification implied by being actions which might typically collocate with human Agents. The incongruity is thus between implied human agent and actual non-human agent.

The Noun Phrase metaphors include Vehicles: **blanket / shield** which are highly incongruous in the Topic context of the **atmosphere / ozone layer**.

G 2 Novelty / Conventionality of Topic- Vehicle Link

The nominal metaphors are more novel than the verb metaphors.

G3 Attitudinal Impact

The beneficial, protective nature of **blanket** and **shield** contrast with the less positive **trap / escape**. On the whole, the nominal metaphors carry positive values of *protecting*, while the verb metaphors equally often relate to *harmful* substances, and carry negative as well as positive values. The use of more 'domestic' Vehicle terms such as **blanket** and **keep warm** suggest an aligning function between writer and reader, in contrast with the possible distancing effect of (non-metaphorical) technical language, such as **radiation**.

G5 Familiarity

All the Vehicle terms might be expected to be familiar to the intended readers, although from differing contexts. For example, **blanket** is likely to be familiar from home, whereas **invisible shield** may have been encountered in **films** such as "Star Wars". Schemata that have been built up from previous experience with Vehicle terms will influence interpretation and so sources of familiarity may influence understanding.

Aspects of the Topic domain, especially relational connections, are shown in the pre-GITA discussion to be less familiar and vague.

G6 Cognitive Demand

The cognitive demand of a metaphor lies partly in the way the linguistic form lays out the informational content, and partly in the lexical content, although these are not independent. As suggested above, the *NP is NP of NP* form may be particularly successful in laying out a useful amount of information for the reader. The Noun Phrase Metaphor Vehicles **blanket** and **shield** are concrete rather than abstract, and at a mid-level of generality. The Topic concept (atmosphere) is general, but becomes more specific when the precise nature of the layers in the atmosphere are described.

The Vehicle terms are not particularly complex; their salient functions are the ones that need to be transferred to the Topic (keeping warm, protecting from danger). The Topic concepts are complex, and some of the problems for the child readers lie in the way this complexity has been condensed and presented in the text.

G8 Systematicity

There is local systematicity across the text in the metaphor chain, which proceeds as

OBJECT	-	FUNCTION	-	FUNCTION	OBJECT	-	FUNCTION	-	FUNCTION	
		(general)		(specific)			(general)		(specific)	
blanket	-	protects	-	kept warm	-	shield	-	protect	-	stops

These positively-connoted words are complemented by negatively-connoted lexis used literally

harmful - safe - dangerous - harmful - useful -harmful - harmful.

A lexical chain using the verb metaphors suggests an underlying notion of 'containment':

escape - kept (warm) - traps - shield - lets through

There is systematicity of form in the parallel (NP *is* NP *of* NP) syntax of the sentences containing the two Nominal Group metaphors.

8.3 Information structure of the Ozone Layer text, and use of metaphor

The propositional knowledge related to the ozone layer is encoded in the text in the following order:

Page 1

The liquid in fridges is harmful.

Gases escape from fridges and are harmful.

The atmosphere is made of different gases.

Ozone is a gas.

Page 2

The sun warms the earth.

The atmosphere keeps some of the heat in.

Some of the sun's energy is dangerous e.g. UV light.

Page 3

The atmosphere protects earth by letting through useful energy and stopping some harmful energy.

The ozone layer is one of the layers in the atmosphere.

It stops some of the UV light getting through.

The text begins with a concrete example (*fridges*) linked to the topic of pollution and the ozone layer, that the writer presumably assumes will be familiar to the reader. The text then moves from the (assumed) known to the less familiar. This knowledge is presented to the reader through several topics (*atmosphere- ozone - sun*) which are introduced and then recur in each page with further and more specific detail added at each recurrence.

This constructs a 'spiralling' text structure, which, while appearing pedagogically sound, fails to help the child readers as much as it could, perhaps because of the amount and density of information included, and perhaps also because of the lack of explicit connections made between concepts. For example, implicit in the text is an equivalence between the items in the lexical chain *heat - energy - radiation - light*, the understanding of which embodies a great deal of scientific knowledge about different forms of energy and the relation between them. Similarly, in the first two sentences, the link between the *gases* and the *liquid used to cool the air in a fridge* is not made explicit, and thus relies on the previously acquired knowledge of the reader. A further outcome of the incremental presentation of information about the key topics of *the ozone layer*, *the atmosphere* and *the sun*, is that the topic of the discourse switches in the middle of "paragraphs", after each pair of sentences approximately. Any connections made intuitively by a reader between rheme of one sentence and theme of the next, in a *new-given* pattern, are as likely to be invalid as to be valid.

Such a cyclical presentation of information on particular aspects of the topic across separate pages and sections of text causes difficulties in processing the information:

L: it's good where it's going on bit by bit (.) but some of the sentences are quite hard to understand

(Tape 8: 312-313)

E: if I was reading this book though I wouldn't remember all the information it's giving
(Tape 8: 444)

E: I think the writer's trying to ..remind you what he's written before so you don't forget
(Tape 8: 565)

The two Noun Phrase metaphors function textually within this structure to switch the discourse topic to *the atmosphere*, and they seem intended to act as introductory explanatory analogies in guiding or reinforcing the understanding of the structure, location and function of the atmosphere. However, as happens throughout the text, they too are followed by sentences that do not pick up their Vehicle / rheme as theme.

8.4 Discourse support for comprehension of linguistic metaphors

In the discussion of the results of Investigation 1 (Chapter 6, Section 6.3), discourse support for the understanding of metaphors was shown to be effected through signalling and through explication in surrounding talk. The text is analysed for evidence of parallel forms of support.

8.4.1 Signalling metaphorical intention

The nominal metaphors are signalled in similar ways to those in talk (Chapter 6, Section 6.3.4):

- The incongruity of the Vehicles is potentially highlighted by contrast with the Topic terms and information presented to the reader before the use of metaphor.
- Both nominal metaphor Vehicles are highlighted by being in rheme position clausally, with the second one also in the topic sentence position at the beginning of its paragraph.
- Both are introduced in the main clause of sentences, a textual equivalent to pausing before Vehicles in talk.
- The first is lexically emphasised through the use of *like*. Neither is accompanied by any other explicit marker such as *imagine that ...* or *we can think of ... like ..*

The verb metaphors are not emphasised with lexical markers or by clause / sentence positioning. They may be emphasised by being fully lexical verbs, and, as mentioned above, by text positioning.

The nominal metaphor signalling appears, from the results of the cross-checking of metaphor identification through recognition (Section 8.2.1 above) to have more impact than verb metaphor signalling.

8.4.2 Supporting the understanding of metaphor

The following factors were found to be employed in spoken discourse (Chapter 6, Section 6.3.5) and are considered likely to be potentially helpful to discourse participants in making sense of metaphorically used language:

- (1) - Pre- and post-modification of Vehicle term by Vehicle-related adjectives or adverbs
- (2) - Repetition of the Vehicle and of the metaphor
- (3) - Relexicalisation of the metaphor (same Topic, new Vehicle)
- (4) - Development of the metaphor through elaboration / expansion / exemplification
- (5) - Negotiation of meaning

Negotiation of meaning (5) will necessarily be a feature of the GITA task, rather than the text. Examining the text for factors equivalent to 1 - 4 above produces the following factors that may predict success and difficulty in comprehension:

(1) Pre- and post-modification of Vehicle

- None of the verb metaphor Vehicles is modified at all.

- Only one Vehicle term is pre-modified: an invisible shield. However, this does not serve to narrow down the attributes of the Vehicle transferred to the Topic, as happened in spoken discourse, since it is a term relating to the Topic domain, rather than to the Vehicle domain. As one of the girls points out, **shields** cannot be **invisible**.
- Post-modification of the nominal metaphors is also Topic related: e.g. surround(ing) the Earth

(2) Repetition

- There is repetition of some verb Vehicles : **escape / protect**

(3) Relexicalisation

- The second Noun Phrase metaphor relexicalises the first (**blanket -- shield**).
- The Verb metaphors are mostly not relexicalised.

(4) Explication

- Each nominal metaphor is expanded in the sentence that follows it, but the expansion is again Topic-related rather than Vehicle-related; the subject of the sentence following the metaphor is **It**, referring to the Topic **atmosphere**.

The atmosphere is the blanket of gases that surrounds the Earth.
It is made up of several layers.

The atmosphere is like an invisible shield of air surrounding the Earth.
It contains different gases.

Furthermore, the extra information does not ideationally fit the Vehicle term; a **blanket cannot** be made up of layers, although, confusingly, it may be one layer of several on a bed. A shield cannot contain gases.

- The help provided to receivers of metaphorically used language in spoken discourse therefore seems to be largely absent from this text. On the contrary, where readers might expect to find further Vehicle-related information, both in modification and in explication, they encounter Topic-related information, that is anomalous in terms of the Vehicle. Analysis of the protocols will show whether and how this causes problems, and whether the participants compensate in their talk about the text sentences.

8.5 Participants' previous knowledge brought to the text and task

From the discussion between subjects and researcher before working on the text, an analysis was made of the subjects' previous knowledge about the Ozone Layer by placing each speaker's transcribed responses in columns in the order in which they were produced (Appendix 6). By reading across the columns and then surveying vertically, something of the state of each subject's understanding can be inferred.

- ◆ The reported sources of the children's knowledge about the ozone layer are primarily TV programmes i.e. visual as well as verbal.

- ◆ The knowledge expressed is non-specific, partial and uncertain:

- The children use vague language to express their knowledge, suggesting uncertainty and incompleteness

R: what is it?

E: a big protective thing protecting the earth from the sun (Tape 8: 21)

E: greenhouse effect and everything (Tape 8: 30)

- Uncertainty is also suggested by the use of questions in responses to questions:

R: how did it get this hole in it?

L: is it from the sun's rays? (Tape 8: 27-28)

- They explicitly refer to a lack of knowledge:

E: I don't know much about it (Tape 8: 72)

L: not really realising what it's all about (Tape 8: 71)

- ◆ The specific knowledge about the ozone layer expressed by the children, in propositional form, is:

Ellen the ozone layer is a big protective thing protecting the earth from the sun
it's got a hole in
there's a connection between the hole and the greenhouse effect
pollution may have made the hole in it
the earth is getting hotter
if the hole gets bigger, it'll get hotter
the ozone layer stops the sun

Louise it's a big hole
the hole may be caused by the sun's rays
the greenhouse effect might be connected with pollution
greenhouses keep heat in

the ozone layer could be trapping all the earth's heat

The knowledge they bring to the text seems to be incomplete, and at a general level. Although some properties of the ozone layer problem are suggested, and thus can be taken as known (*hot / protect / hole*), there is no indication that either girl understands the relational connections e.g. how the hole was caused, or how the ozone layer works to protect. Neither mentions "ozone" separately from *the ozone layer*, that ozone is a gas, or that it is part of the atmosphere.

The greenhouse effect seems to serve as a gross-level metaphor that, through frequent use, becomes familiar and is assumed to be understood. However, this is a false sense of understanding (Chapter 6, Section 2.2), since when forced to explain it in detail, both researcher and children found themselves prevented by lack of specific understanding

R: when you try and understand it

E: it's when it gets all mixed up

(Tape 8, lines 65-70)

- ◆ In this discussion, the girls spontaneously produce the verbs *protect* and *trap* that were identified as linguistic metaphors in the text.

8.6 The potential of text and metaphors for contributing to learning

The participants do bring some knowledge about the ozone layer to the reading task; they have some basic acquaintance with key terms, and a beginning of understanding of relations between them, but there is clearly potential for growth in understanding. The text has been shown to include information that could add to the participants' hazy understanding of the link between the greenhouse effect and the ozone layer through providing precise information about ultra-violet light as being the particular aspect of the Sun that is harmful, how the ozone layer prevents UV causing a problem, and thus why a hole in it would be dangerous. The initial example of the fridges offers again a specific example of the children's general "pollution" idea.

Section 7.2.2 suggested a range of ways in which metaphor might contribute positively or negatively to learning. Applying these in theoretical analysis of the text suggests the following points related to learning. Protocol analysis will allow confirmation or disconfirmation of these predictions:

1. The two nominal metaphors appear to be potentially memorable through their incongruous T-V links, and may as such assist recall of content. They are familiar to children and should thus help develop understanding of the function of the atmosphere.

2. The lack of Vehicle explication, together with the salience of *layers* for the Topic but not for the Vehicle, may predict difficulties in making use of the metaphor to restructure Topic knowledge.
 3. The metaphors may also be working at "the wrong grain size" (Spiro et al 1989:507) in that they both take *the atmosphere* as Topic, whereas the major topic of the text is one part of the atmosphere, the ozone layer, rather than the whole thing.
- Both these latter issues may lead to the metaphors being less than fully helpful in supporting cognitive change.

In summary, the nominal metaphors would seem likely to be accessible to the intended readers, but several discourse features may mislead readers in learning more about the Ozone Layer from the text. Non-metaphorical features of the text also seem likely to cause comprehension problems.

8.7 Noticing metaphors in the GITA task

Having analysed the knowledge brought to the reading task, the linguistic metaphors and their place in the information structure of the text, I have shown how the metaphors in the text offer some potential for learning. Analysis of the GITA protocols, in which the children work on the text sentence-by-sentence, will now reveal how far this potential was achieved, and how features of the text and the metaphors contributed, negatively and positively, to the processes of making sense and of learning.

The metaphor processing categorisation system (Table 7.3) was applied to the protocol for each sentence containing a linguistic metaphor. The first very clear result is that nominal metaphors were noticed quite differently from verb metaphors (Chapter 2, Section 2.6.1). The protocols show that the two nominal metaphors were noticed and were metaphorically processed; the Vehicle lexical items were repeated, and commented on, and the use of the metaphor was spontaneously evaluated.

e.g. E: it's quite a good way of putting it (Tape 8: 214)

There is no evidence that the Verb metaphors were explicitly noticed; there was no discussion of particular lexical items or evaluative statements immediately after reading the sentences aloud as with the nominal metaphors. In fact, a stronger conclusion - that the Verb metaphors were not noticed, is suggested by the unmarked use of the Vehicle lexical item by the children within the protocols. This was the case for each of the 7 verb metaphors, and is exemplified with the protocol of Sentence 9, which contained three verb metaphors:

The Earth is **kept warm** by the Sun's heat, and the atmosphere **traps** some of this heat so that it doesn't **escape** into space.

When the protocol is analysed, it is seen to include each of the Vehicle terms, used by the participants in discussing the meaning of the sentence, in other forms:

we can keep warm

it's trapped by the atmosphere

once it's been trapped by the atmosphere

none .. can escape into space

Explicit noticing is thus only evidenced for the nominal metaphors.

Close analysis of the protocols of sentences with verb metaphors showed, however, a tendency to inaccuracy of interpretation that will be elaborated in Section 8.9 below. I first focus on the processing of nominal metaphors.

8.8 Making sense of the nominal linguistic metaphors in the GITA task

The two nominal metaphors were interpreted without difficulty in the discussions between the girls, and so I would expect that, in normal reading of the text, they would have been comprehended without problems. Table 8.4 below summarises the processing of the two nominal metaphors; a cross indicates an occurrence of the processing category.

Table 8.4 Processing of nominal metaphors in the GITA protocols - The Ozone Layer

Nominal Metaphor	4. a <i>blanket</i> of gases	14. an invisible <i>shield</i>
Processing		
1. Evaluation	xxx	x
2. Metaphor Restatement	x	x
3.1 Vehicle Explication	x	xxxx
3.2 Vehicle Repetition		xxxxx
3.3 Vehicle Relexicalisation		
4. Vehicle Contextualisation	x	x
5. Topic Development	x	x
6. Metaphor Construction	x	x
7. Metaphor Reference		xxxxx

Table 8.4 suggests that the *shield* metaphor required more processing than *blanket*, and that much Vehicle processing work is done, mainly through explication and

contextualisation. I now look at the protocol of each in detail, considering issues of accuracy and richness of interpretations, and problems in processing.

8.8.1 Analysis of the processing of nominal metaphor 1 - "the blanket of gases"

Table 8.5 displays the processes, and the utterances that identified them, for the first nominal metaphor. It is clear from the distribution of utterances and their content, that this is a jointly constructed interpretation, and that the two girls contribute differently to the interaction.

Table 8.5 *GITA protocol and categorisation of metaphor processing: Sentence 4*

The atmosphere is a blanket of gases that surrounds the earth.

	Utterance	Metaphor process
1	E: I thought gases were meant to be harmful	
2	L: there's all types of gases though	5. TOPIC
3	E: one that protects the earth and one that	DEVELOPMENT
4	L: there's helium(.) there's (1.0) helium (2.0) carbohydrate (2.0)	
5	um (5.0) but I can't remember it now there's all different types of	
6	gases on different planets	
7	L: in a way that does help a little bit though (.)	1. EVALUATION
8	cos it sort of like (.) saying (.) it's like a blanket that protects it	2. METAPHOR RESTATEMENT
9	E: there's actually two types of gases (.) there's a bad type of gas and	5. TOPIC
10	a good type of gas	DEVELOPMENT
11	which is a (.) blanket around our earth	3. VEHICLE DEVELOPMENT 3.1 VEHICLE EXPLICATION
12	E: it's quite a good way of putting it though ..cos it's easy to	1. EVALUATION
13	understand	
14	L: it's helping us to understand	1. EVALUATION
15	E: cos when you're in (.) bed you've got a blanket sort of (.)	4. VEHICLE
16	protecting you from the cold	CONTEXTUALISATION
17	L: yea (.) and then there's another type of blanket which is of gases	6. METAPHOR
18	(.) surrounds the earth	CONSTRUCTION

(Tape 8: 198-220)

(1) The role of previous Topic and Vehicle knowledge in processing

The Topic is developed first in this protocol because Ellen states a problem (line 1) in making sense of Sentence 4 in the light of information from Sentence 3; the previous sentences had included the phrase "harmful gases", referring to the CFCs emitted from

fridges, and Ellen assumes that the gases referred to here are also harmful, contradicting the implicit positive connotations of **blanket**. Louise brings her previous knowledge to bear on this conflict (lines 2, 4-6), and Ellen picks **this** up and returns to the metaphor in lines 2, 9-10. The inaccuracy of Louise's specific knowledge of gases in the atmosphere (*carbohydrate* in line 4) does not cause a problem here because they work at a more general level of *good and bad gases*. It is clear though that Topic knowledge plays an integral role in the interpretation of the metaphor, and that interpretation is affected by the anaphoric reference wrongly assumed by Ellen i.e. the discourse context of the metaphor influences interpretation.

(2) Accuracy of the metaphor interpretation

Vehicle construction takes place through expansion: *the gas is a blanket around the earth* (lines 10 and 11), and through contextualisation *in bed you've got a blanket protecting you from the cold*. The first of these is actually a **different** interpretation from that presumed intended by the writer; it is the atmosphere that is compared to a blanket, not just a particular gas. Although Louise, in line 17, returns to the correct Topic reference (*gases*), the misconception continues as the participants work on through the text, and is compounded by the sentence that follows the one about the blanket. Sentence 5 states

It is made up of several layers.

I noted in the theoretical analysis that, whereas, in talk, utterances around a metaphor often provide further information about the Vehicle, in this written text, no further Vehicle-related information is given. The **It** in Sentence 5 refers to **the atmosphere** not to a **blanket**. However, **blanket** and **layers** are quite easily interpreted as linked, and the juxtaposition seems to confuse the participants, who may also be expecting Vehicle-related information. In the protocol of Sentence 14, Louise recalls:

a layer like a blanket and now he's talking about it as a . . . (Tape 8: 468)

(3) Richness of metaphor interpretation

The explicit interpretation is fairly minimal, limited to mention of the Topic attributes of being *around the earth* and *made of gases*, and the function of *protecting*.

Processing of nominal metaphor 1 - "the blanket of gases": summary

This metaphor is successfully interpreted, although with some inaccuracy. It is positively evaluated by the participants. Interpretation is clearly dependent on Topic knowledge, both previous knowledge and information carried in the text. The discourse context affects the metaphor interpretation through reference.

(1) Accuracy of metaphor interpretation

The reformulation in line 28 suggests a misunderstanding. In the original sentence the atmosphere is compared to a **shield of air** which surrounds the Earth, and with the intended meaning that the air protects the Earth. Line 28 suggests that Louise has interpreted this differently and that the *shield is protecting the air*. This misunderstanding may be linked to lack of specific Topic knowledge that is displayed throughout in the connection between concepts of *atmosphere / gas / air / ozone*. Some utterances seem unproblematic, and yet in the protocol for Sentence 16, Louise asks

is ozone a type of gas?

(Tape 8: 552)

My conclusion would be that the domain linked to *atmosphere* is partly understood but still in need of some restructuring and consolidation.

(2) Role of previous Vehicle knowledge and Topic knowledge

Vehicle Explication in this protocol is limited; most of the Vehicle related processes in Table 8.6 do not develop the Vehicle *shield* very far beyond the general contextualisation: *protect you when you're having a war or something*. Possible reasons for this are suggested in later protocols, when the Vehicle *shield* is brought back into the discussion of Sentence 16 by the researcher. This is discussed in detail in 8.9.1 below, but we can note at this point that the problem in developing the Vehicle seems to lie in the properties that can be assigned to the Vehicle, given the Topic. Without being able to make sense of the properties of the Vehicle, the girls seem unable to follow through to an understanding of the function and relational connections between Topic and Vehicle. As pointed out in 8.4.1, the pre-modification of a Vehicle term by a Topic-related term is not common in talk, and this may be a contributory factor to the difficulties experienced by the girls.

Vehicle Contextualisation seems to be a key process in interpretation, and the choice of Vehicle will influence the contextualisation possibilities open to individuals. A week later when the metaphor was discussed by the group of 5 children, Dougal, the only boy, was more specific in his contextualisation;

a shield protects you from swords

(Tape 9: 116-117)

The degree of specificity with which children are able to contextualise reflects their experience and previous knowledge.

(3) Richness of interpretation

The interpretation reached is again minimal; basically only the function of *protecting* is apparent, and further interpretation appears to be inhibited by Topic domain confusion and by choice of Vehicle.

Processing of nominal metaphor 2 - "an invisible shield": summary

As with the blanket metaphor, the subjects had no difficulty in processing the metaphor, although again there was some inaccuracy and incompleteness of interpretation.

There is a similar distribution of tasks between the subjects, with Louise reading aloud, restating the metaphor, evaluating the metaphor, and constructing the metaphor at the end. Ellen performs the role of Vehicle Development and Contextualisation. This may be due either to Ellen needing to do more unpacking of the metaphor than Louise, or to Louise adopting the more dominant role, perhaps because of her greater level of involvement in the research.

8.9 Making sense of Verb metaphors

I have already commented on the difference in Noticing for nominal and verb metaphors. The question remains as to whether and how processing of nominal and of verb metaphors differs. The results in this section may shed some light on that question.

8.9.1 Processes used in making sense of verb metaphors

The protocols involving the potential verb metaphors identified by the researcher and the adults (Table 8.3) were examined in terms of the categories for metaphor processing, and showed quite different results from those of nominal metaphors (Table 8.7 below), suggesting that the processing of verb metaphors is manifested differently.

Table 8.7 Processing of Verb metaphors in the GITA protocols - The Ozone Layer

Processing	Verb Metaphor	3. escape	6. protects	9. kept warm	9. traps	9. escape	15. protect	16. lets through
1. Evaluation							x	x
2. Metaphor Restatement								
3.1 Vehicle Explication								
3.2 Vehicle Repetition		x	xx	x	xx	x	x	xx
3.3 Vehicle Relexicalisation		<i>go into</i>				<i>gets out</i>		<i>goes through</i>
4. Vehicle Contextualisation								
5. Topic Development		x	x	x	x	x	x	x
6. Metaphor Construction								
7. Metaphor Reference							xx	xxx

These results differ from those for the processing of the nominal metaphors in the following ways:

- Evaluation occurs less often, and towards the end of a protocol rather than immediately after the reading aloud.
- Restatement, Vehicle Explication and Metaphor Construction do not occur.
- Topic development occurs regularly.
- Relexicalisation of the Vehicle is less frequent; it is in each case through a prepositional / phrasal verb.

8.9.2 Accuracy in verb metaphor processing: Topic Reference Shift

In the protocols, Topic Development is in each case related to the Subject or Object/Complement of the verb Vehicle, and for 4 of the 7 verbs, this goes slightly wrong for the participants, producing interesting evidence, suggestive of a pattern of inaccuracy in the interpretation of the Subject or Object of the verb metaphor Vehicle. The reader may recall that in Chapter 3 the identification procedures for verb linguistic metaphor required attention to be paid to the Subject (and if present, the Object / Complement) of the verb Vehicle, in order to justify, theoretically, the existence of an incongruity between the Subject of the verb used in another, non-metaphorical and non-polysemous, sense, and the Subject of the verb in the discourse context under consideration:

e.g. **escape** is identified as a metaphor when used in
harmful gases can **escape** into the atmosphere

because some other non-polysemous sense, with an animate Subject of **escape**, is taken as primary and non-metaphorical. In the instances of inaccurate processing found in the Ozone Layer protocols, some transfer of **animacy** seems to take place. This phenomenon of a slippage in the Subject or Object of the verb during Think Aloud is labelled **Topic Reference Shift**.

Topic Reference Shift 1: harmful gases as Subject of escape

In the first two sentences of the text, the writer uses a concrete example of CFCs emitted when old fridges are destroyed to set the scene for topic of the book as a whole:

2. It may seem strange that the liquid used to cool the air in a fridge could be harmful to life on Earth.
3. However, when old fridges are destroyed harmful gases can **escape** into the atmosphere.

When processing sentence 3 in the Think Aloud task, the girls are not able to reach an accurate understanding of **harmful gases**, because of a lack of relevant previous

knowledge and because of the unhelpfully inexplicit text. There is an (implied) anaphoric link between the **liquid** in Sentence 2 and **harmful gases** in Sentence 3, but there is no explicit statement that the liquid changes into a gas, or that the gases are / contain CFCs. As shown in Extract 23, questioning by the researcher revealed that the participants did not know that there was liquid in a fridge (lines 6 and 8). Furthermore, they did not make the connection between *liquid* and *gases*, but seemed to make sense of the Subject of *can escape* in the second sentence as unconnected with *the liquid* (line 2):

Extract 23 The link between liquids and gases in the Ozone Layer protocols: Sentences 2 and 3

- 1 R: what's the (.) link between the liquid and the gases?
 E: both bad for the ozone layer
 R: mhm
 L: yea
 5 R: where do the gases come from? (2.0)
 L: is it (1.0) the liquid?
 R: oh right
 E (whispers) I don't know
 L: is it fuels and things?

(Tape 8: 162-170)

Their lack of Topic-related knowledge, in particular that liquid in a fridge gives off CFC gases when exposed to air, leads to only a partial understanding of the Subject reference *harmful gases*. In this case, there is no evidence that the problem of misinterpreting the Subject is augmented by the verb being metaphorical, but the next sentence protocol to be examined is more suggestive of such evidence.

Topic Reference Shifts 2 and 3

9. The Earth **is kept warm** by the Sun's heat, and the atmosphere **traps** some of this heat, so that it doesn't **escape** into space.

The beginning of the protocol for this sentence is shown in Extract 24:

Extract 24 From the Ozone Layer GITA Protocols: Sentence 9

- 1 L: so that means the heat that comes in (.) it's (1.0) it's trapped by the atmosphere (.) and then (.) so (.) none of the atmosphere can escape into space (.) so we can keep warm (.)
 R: mmhm
 L: by the sun's heat (.) once it's been trapped in by the atmosphere
 5 E: and go lovely and brown
 L: I can't stay in the sun long enough

(Tape 8: 302-307)

trap is not a problem; it is repeated twice, grammatically transformed to the passive voice. The Subject of **trap** remains **heat**, although reduced to pronominal form. However, when **is kept warm** and **escape** are repeated and transformed in line 2, the repetition is accompanied by a shift in the Subject reference. In the first case, **The Earth** is replaced as Subject by *we* in line 2; i.e. **The Earth** becomes **people on the Earth**, with the last two lines in the extract suggesting that the girls are thinking about themselves in particular. I assume that the author's intended Subject was 'the Earth and everything on it', and suggest that the particular interpretation reached by the children may have been prompted or motivated by the animacy of the metaphorically used verb.

In the second case, there is not a **shift** to a Subject that is a part of the intended Subject, but a misinterpretation of the anaphoric reference of the Subject **it** in **it doesn't escape into space** (Sentence. 9). Louise restates this, incorrectly, as *the atmosphere cannot escape into space* (line 2), although she repairs this almost immediately with *the sun's heat (.)once it's been trapped in*. Given her previous knowledge, this first interpretation is reasonable; after all, the atmosphere is made of gases, and in our real-world experience, and in the second sentence of the text itself, gases do escape.

- We see here how Topic-related knowledge is needed to disambiguate the reference, and how uncertain Topic knowledge can mislead, if only temporarily. Further difficulties are added by the complex sentence structure in which the verb metaphors occur, and possibly by the earlier use in the text of the verb metaphor **escape** with a different Subject.

Topic Reference Shift 4: Subject reference of **protecting / protect**

The heading of the middle section of text was "Protecting Earth". When the girls are asked to predict what the content of the section will be, they suggest:

- E: how to stop all the (.) tion and things like that
 L: [pollution
 E: how we can help (.) protect the earth (.) laugh

(Tape 8: 453-455)

The non-finite verb **protecting** is transformed into a finite form, with the human Subject *we*.

However, two sentences later they encounter

15. It contains different gases which **protect** life on the planet.

In discussing this sentence, Ellen comments that the heading does not appear to have been not very suitable for the text:

Extract 25 From the Ozone Layer GITA protocols: Sentence 15

- 1 E: this um protecting earth it isn't very good for this bit because it's the sort of (.) same thing we did before and it isn't telling you how (hh) to protect the earth which (*laugh*)
we
said it would be when it said protecting earth
R: right (2.0) who's doing the protecting here?
5 L: it's the (.) shi (.) the invisible shield

(Tape 8: 495 - 499)

In fact, the heading was suitable for the text underneath it, if the verb had been interpreted metaphorically. Again, the girls' reading of the earlier parts of the text, about the dangers of ordinary things like fridges, seems to have created an expectation that later parts would link into this by showing how human behaviour could be adjusted. This led to a literal interpretation of Protecting Earth, with an inappropriate assumed Subject reference.

Topic Reference Shift 5: Object reference of lets...through

In discussing Sentence 16 (Extract 26), several problems seem to coincide, all linked to lack of Topic knowledge, which prevent the girls from making sense of the sentence.

16. The atmosphere **lets** useful energy **through**, but reduces the amount of harmful energy reaching the Earth's surface.

Extract 26 From the Ozone Layer GITA protocols: Sentence 16

- 1 R: well you tell her what you can understand and then maybe she'll be able to help you
L: well (.) it's letting through useful energy but then he's telling you about harmful energy (.) which is quite complicated to understand
E: oh I get it now (.) right (1.0) the (1.0) shield (*laugh*) is (.) um (.) letting through all
5 the (.) good kind of gases and (.) then it's not
L: it's reducing the amount of harmful energy (.) the shield (.) must be reducing (.) the amount of harmful energy (.) reaching the earth's surface (.) but there's still
R: [how could it be doing that?
L: but there's still probably (.) harmful energy coming through (.) it's just reducing
10 R: right
E: some of the harm (.) harmful harmful energy is (.) running out on the earth (*laugh*)
R: so (.) how do you think the shield is (.) is doing this? (4.0)
E: I don't really know what it (.) like it's made (???) I don't really know what it's kind of meant to be (.) I know what it is it protects us but
15 L: [how (.) come (.) the shield is (.) reducing the amount of (.) harmful energy (.) when it's just an invisible type?
R: mm
E: I don't know what it's meant to be=
L: that's quite complicated
20 E: = I don't know whether it's like (1.0) I sometimes think of there being a big ball of glass (.) or something like that (.) but I don't really know what it's (.) kind of of like made up of (.) or is it made of gases (*laugh*)
L: it's not really (.) describing what it's made up of or anything (.) it's just telling you about it

(Tape 8: 522-541)

Ellen states that she cannot understand the sentence, and I suggest that Louise try to explain it to her, even though she herself is struggling. In Extract 26, Louise struggles to explain the sentence, and Ellen brings the metaphor of the **shield** back into the discussion (line 4), but even this does not seem to help:

One of the basic problems here is with **useful energy** and **harmful energy**, the first of which occurs as the Object of the verb metaphor **lets through**. Again, it is not clear whether, or to what extent, the misunderstanding is aggravated by the metaphor; certainly a number of factors combine to create difficulties, some of them related to metaphor. In lines 4 and 5, Ellen shifts the Subject of the verb metaphor from *the atmosphere* to *the shield*, and marks this re-use of the nominal metaphor with a turn-internal laugh. Ellen's unmarked position for a laugh is at the end of her turn. She re-uses the verb metaphor with a change in tense, and the Object is erroneously relexicalised as *the good kind of gases*. It is clear, from this and other protocols, that the children did not know that *light* is a type of **energy**, and that *gas* is not a type of **energy**. When trying to make sense of sentence 10 - But not all the energy made by the Sun is safe, the girls were asked what they thought of when they thought about energy, and they had replied:

L: it's the thing we have

E: it's when you run

(Tape 8: 358-360)

They do have a meaning for **energy** but it is distinct from the technical meaning intended in this text to include light and heat. The text provides no help with the intended meaning, and no explicit clue that a technical meaning is required, with the result that the girls are forced to work with their existing, everyday meaning of the word. Ellen's interpretation here, that **energy** is the same as *gases*, seems an intelligent one, given the knowledge she brought to the text, and given the earlier collocation in the text of **harmful** with *gases*. Louise continues to use the full phrase **harmful energy** throughout.

Lines 12-18 show how the metaphor of the **shield** cannot be developed to help the participants understand the Topic more clearly. They cannot get past its basic function of **protecting** because they cannot imagine how it can work to stop *energy* / *gases* coming through. Their lack of knowledge can be seen to combine with a rather unhelpful metaphor Vehicle to limit their understanding of the topic to 'patches' of clarity in an overall mist of confusion that the text repeatedly failed to dissolve.

Ellen's own metaphor of *a big ball of glass* presents the same problem, in that it helps imagine the general function, and perhaps too the appearance, of the atmosphere around the earth, but fails to help with the relational properties that lead it to function protectively.

8.9.3 Making sense of Verb metaphors: summary

In summary, the verb metaphors appear to be processed differently from nominal metaphors, with the major locus of processing focused on the Subject or Object of the verb. Misinterpretations are seen to take the form often of incorrect Subject / Object reference. These Topic Reference Shifts seem to be due to a combination of:

- partial or inaccurate Topic knowledge brought to the text
 - earlier, misleading collocations in the text
 - complex reference within or between sentences
- and
- a metaphorically used verb
- ◆ It is as if the use of a verb metaphor 'loosens' the Subject / Object reference, and that accurate Topic knowledge is required to 'fix' it. When the text presents other difficulties, there is a risk of a shift in Subject / Object reference of verb metaphors. In some cases, the Subject / Object shift may be repaired; in others, it is absorbed into the processing and may mislead understanding.

8.10 Problems in making sense of the text

The protocols demonstrate that the girls had problems with understanding 11 of the 18 sentences. Most of these problems had several sources:

5 derived from the use of words unknown to the children

ultraviolet; benefits; energy; radiation

7 involved lack of background knowledge which the writer assumed of the reader

about energy / heat / light / radiation; liquid in a fridge / gases;

5 involved some complicating aspect of text or sentence structure

e.g. unclear reference in and between sentences; long Subject NP

The nominal metaphors presented no problems in understanding, although they did allow for Topic shift that led to the inaccurate interpretation confusing *atmosphere* and *ozone layer*.

8.11 Analysis of knowledge about the Ozone Layer in post- GITA discussion

8.11.1 Content of recalled information

Immediately after completing the GITA reading task, the participants evaluated the text and the "useful" information they had gleaned. Extract 27 includes some of their comments, and shows that they were aware of their difficulties:

Extract 27 The Ozone Layer: immediate post - GITA discussion

- 1 E: ??? not very good explaining for a younger child
R: why not?
E: because it's very hard to understand for even us (*laugh*) we're
R: how would you make it easier?
- 5 L: by putting simpler words in (.) some of those words and =
E: [and it's
L: = describing the words that he put in (.) cos he put (.) even if he did put smaller words (.) the big words that he DID put in (.) he put he just put the big words (.) which meant nothing (.) well meant something but didn't mean anything to me and (.)
- 10 then he just carried on (.) and (.) he should have explained what that word meant (.) and then (.) carried on
R: and did he do anything that was useful?
L: yea (.) he (.) like he (.) told us the height (.)
E: [the blanket and the shield
- 15 L: he told us like the height (.) where the atmosphere=
R: [mm hm
L: = containing ozone is
E: the shield is quite
L: [that's quite interesting to know
- 20 E: the shield was quite helpful because it (.) you know that a shield is protective (.) and so that was telling you that the ozone layer was protective
R: right (.) okay (.) this is the book then (.) you can see

(Tape 8: 623 - 643)

It is interesting to note the different types of content recalled by the two girls: Ellen recalls the two nominal metaphors (line 14); Louise recalls the non-metaphorical information about the height of the ozone layer above the earth (line 13). This preference of Louise for figures rather than the figurative, recurs in the later discussion and in the next text GITA.

The information recalled immediately includes explicit mention of the two nominal metaphor Vehicles, and the fact of their protective function (line 20). As seen in the analysis of the processing of the metaphors and the text, more detail about how the ozone layer protects the earth was not accessible.

One week after reading the text, the participants' recalled knowledge was assessed from transcription of a discussion with three of their peers, in which they were invited to retell what they had found out. The following extracts from the transcription are placed in columns to facilitate analysis of the knowledge retained by each person:

Extract 28 The Ozone Layer: delayed post- GITA discussion

Researcher's query	Louise's response	Ellen's response
(1) ..explain to the others what they found out last week	(3) learned about chemicals and gases	(2) ..it was about the ozone layer
(6) what did you find out about it?	(5) what's harmful..the ultraviolet rays...about fridges... (7) if people don't stop using CFCs the ozone layer will be getting thinner and thinner (.) it will be letting in more ultraviolet rays	(4) what's harmful to the ozone layer (8) and we learnt that when like cans of CFCs could still be affecting the ozone layer a hundred years later
(9) what <u>is</u> the ozone layer?	(10) it's it's it's (12) it's a type of gas (14) it's like an invisible shield around the earth (16) and it's protecting us from getting too much UV ... (19) the ozone layer's only 10 to 30 kilometres high	(11) it's the thing that protects the earth (13) gas (15) or blanket (.) as the book put it (17) made of lots of different gases (18) it lets some of the sun's rays in but not all of them (20) ... that's why she remembered it (.) she was so amazed about that

When asked directly in (9) about the ozone layer, there is a contrast with the pre-GITA discussion in that the language used is much less vague (no questions, and more precise terms) and the information seems more evenly shared by the two girls.

The information about chemicals and CFCs had been encountered after the GITA task, when the girls looked at the rest of the book. This seems to have helped concretise the idea of harmful substances that is first recalled. One reason for it being remembered is

the numerical information *a hundred years later*, which seems to create a strong impression. Louise later in the discussion (19) also recalls, precisely, the information about the height of the ozone layer.

The function of the ozone layer is also recalled (7-18) in more detail than was available pre-GITA, with some sense made of the problematic *UV / rays*.

8.11.2 Inaccuracies in recalled information

Topic Reference Shift is again evident in long-term recall; both nominal metaphor Vehicles reappear more or less verbatim, but with a different Topic from that used in the text. Louise uses the metaphor of the **shield** to apply to the ozone layer, whereas the text applied it to the atmosphere. Ellen picks up the turn and recalls **blanket**, also originally applied to the atmosphere. She seems to transfer with the metaphor the layered nature of the atmosphere and states that the ozone layer is made of lots of gases, contradicting Louise's and her own earlier description of the ozone layer as a *type of gas*. What is recalled is consistent with the misinterpretations noted in the GITA processing in Section 8.7.

8.12 Summary of effects of metaphor on learning

- processing of the metaphors led the participants to realise that they had gaps in their understanding of the function of the ozone layer
- the nominal metaphors appear to offer some support for the development of the participants' understanding of the ozone layer properties and functions
- the nominal metaphors are recalled immediately after reading, and one week after reading, suggesting that they assist recall
- longer-term recall contained the same inaccurate links between Topic and Vehicle as the initial processing. The use of metaphor appears to raise the possibility of Topic shift, and subsequent conceptual inaccuracy.
- the cognitive change actually supported by the metaphors is limited; the choice of metaphor Vehicle inhibits the development of understanding of how the ozone layer works to protect, at any more than the most general level
- at the same time, the detailed areas of the topic most in need of cognitive change are not supported by the use of metaphor. The use of metaphor with different Topics might have helped more learning to take place.

8.13 Preliminary discussion of results of GITA 1, The Ozone Layer

Section 7.3 of Chapter 7 set out the research questions to be addressed by Investigation 2. At this stage in reporting the outcomes of Investigation 2, I discuss results so far in terms of these questions. I then proceed, in the next chapter, to report the results of the second GITA task using the text "The Heart", and discuss findings across both sets of results.

1. Is there evidence that the children process linguistic metaphors in the texts metaphorically?

Evidence has been found that the nominal metaphors are processed metaphorically through Topic and Vehicle Development and recombination in Metaphor Construction. The processes in the children's protocols were very similar to those of the adults in Steen's study (Steen 1992).

For verb metaphors there is some evidence that the use of metaphor can lead to Topic Reference Shift, affecting Subject or Object reference, although this was not signalled as conscious by explicit discussion or metalanguage.

2. How is previous knowledge of the Topic and Vehicle used in making sense of metaphor?

The literature on children's understanding of metaphor suggests that Vehicle knowledge is very important in the success or otherwise of making sense of metaphor. In this investigation, it has been clear that Topic knowledge plays an equally crucial role in making sense of the metaphors in their discourse context. Topic knowledge is needed, in interaction with Vehicle knowledge,

- to disambiguate pronominal and other anaphoric reference
- to prevent the Vehicle being associated with the wrong aspect of the Topic, or the wrong Topic altogether, in interpretation and in recall
- to allow participants to access the appropriate property of the Vehicle to transfer.

Vehicle knowledge was not a problem in this particular text, since the nominal metaphors were quite simple. Even so, it was clear that it played a role in interpretation:

- to signal an incongruity and thus prompt metaphoric processing
- to identify key properties to transfer, through contextualisation in terms of the participants' life experience and through Vehicle Development
- to provide sufficient transferable properties and relational connections at appropriate levels of specificity

Topic Reference Shift

It was noted that several instances of misinterpretation occur in the original processing of the text and in recall. In fact, the metaphors often apply quite appropriately to erroneous Topic (e.g. the ozone layer rather than the atmosphere), and in terms of knowledge development the errors are not important. However, as a reminder of how loosely information is connected to language form, this error is significant. A match between words and one's knowledge structure seems more salient than careful attention to syntax and the logical relations encoded by it. Since metaphor forces a receiver into searching for appropriate but approximate matches, it may be that such slippages are more likely to occur in metaphor processing than in the processing of non-figurative language. This suggests an interesting paradox or conflict between the needs of science texts to inform accurately, and the inaccuracy prompted by use of metaphors employed to inform effectively.

3. How do encounters with metaphor contribute to cognitive change, positively or negatively?

As summarised in Section 8.12 above, encounters with the metaphors did seem to add something to participants' understanding. However, this was limited and somewhat inaccurate. The reasons for the failure of the **shield** and **blanket** metaphors to add further to the participants' knowledge lay, not in their previous knowledge, but rather, in the limitations of the chosen Vehicles (and Topics) at a detailed level to provide transferable relational connections. The chosen Vehicles were not sufficiently cognitively complex to develop understanding in the direction required. To this extent, the writer may be said to have misjudged the needs of the intended readers.

4. How does metaphorical language assist recall of information?

The selection of striking Vehicle terms assists recall directly, although, as seen above, recall is not always precisely in line with the intended meaning of the writer.

Indirectly, recall seems to be assisted through the deep and active processing prompted by inclusion of the metaphors in the text.

5. What is the role of mediation and multiple use of metaphor, where offered, in reaching shared understanding? are there factors that appear to influence success in mediation?

Multiple use of metaphor in this text was limited to the relexicalisation of the Vehicle from blanket to shield. It appears that this helped understanding by providing two aspects of the atmosphere: protection and stopping harmful radiation. As already pointed out, what was needed to prompt useful cognitive change was further metaphor that might illuminate more precisely how this protection and stopping is brought about, and what precisely is being stopped.

Information about the productive mediation of metaphor can be gathered from the gap between the assistance provided for metaphor comprehension in the classroom discourse analysed in study 1, and the immediate linguistic context of the metaphors in the Ozone Layer text as set out in Section 8.4.1. It was noted there that the text did not provide very much Vehicle-related information in modification, relexicalisation, or explication, and in fact offered Topic-related information where one might expect to find Vehicle-related information. In the protocols, discussion of the nominal metaphors revolves around the Vehicle term and seems to provide just the kind of support that is missing in the text. This finding can be accounted for by accepting that making sense of metaphor (or at least, of nominal metaphor) involves the Vehicle-related processes of the categorisation system, and that in classroom discourse, the teacher was verbally providing these for the pupil listeners as an inter-personal scaffold for understanding. In the GITA protocols, the girls were providing them for each other and for themselves. An alternative, weaker, view, might be that the pupils in GITA were replicating the teacher talk around metaphor they were familiar with. However, it is unlikely that they would do this unless it were also helpful in the task of making sense. From these observations, I hypothesise that helpful mediation of metaphor will generally include the Vehicle-related processes in Table 7.3, with particular emphasis placed on those aspects where participants may experience most difficulty.

CHAPTER 9

EMPIRICAL INVESTIGATION 2 - CHILDREN MAKING SENSE OF METAPHOR RESULTS (TEXT 2 - THE HEART) AND DISCUSSION OF RESULTS.

9.1 Introduction

In this chapter, I report the outcomes of the goal-directed interactive Think Aloud reading of the short text about the heart and how it works. (The text can be found in Appendix 4). The full results of Investigation 2 are then discussed in terms of the research questions, and implications for writers using metaphors in texts are listed.

9.2 Linguistic metaphors in the text

9.2.1 Identification of linguistic metaphors

The linguistic metaphors in the text were identified and cross-checked as for the first text. 14 metaphors were initially identified by the researcher:

Table 9.1 Linguistic metaphors identified in "The Heart" by the researcher

sentence	
1	Blood is the body's transport system
2	At the centre of this system is your heart
5	The blood is pushed around your body
6	blood brought back to it by other tubes
7	this pumping
10	your "pulse rate" tells you how fast your heart is beating
11	No man-made pump is as reliable as your heart
12	It can beat ... without a rest
13	the heart is adjustable
14	it pumps
15	The adjustments are controlled by nerves
16	your heart might ... pump
17	it .. pumps three times as much blood

Inter-rater reliability of metaphor identification

The identification was cross-checked as for the first text, N = 17. The results are summarised in Table 9.2. 13 metaphors were identified by 3 or more subjects. However, many of these were different from those in Table 9.1.

Table 9.2 Linguistic metaphors identified in "The Heart" by adult subjects

sentence	Linguistic metaphors underlined	Number of subjects identifying this as metaphor [N=17]	%
1	blood is the body's <u>transport system</u>	16	94
3	it (heart) has four <u>chambers</u>	12	71
3	with muscular <u>walls</u>	12	71
4	strong <u>tubes</u>	11	65
7	This <u>pumping</u>	9	53
4	(the walls) ... <u>squeeze</u> blood	6	35
5	The blood is <u>pushed</u> around your body	6	35
4	the walls <u>contract</u>	4	24
11	(No man-made) <u>pump</u>	4	24
2	the centre (of this system)	3	18
6	the heart <u>relaxes</u>	3	18
8	blood <u>surging</u>	3	18
9	each <u>surge</u>	3	18

Other metaphors identified by one or two respondents:

- 10 your heart is beating
- 12 a rest
- 15 adjustments are controlled
- 17 run a race
- 13 adjustable
- 10 pulse rate

Although the responses are graded as before, there is much less overlap between the researcher and the adults, with just 5 metaphors found in both sets:

- 1 Blood is the body's **transport system**
- 2 At the **centre of this system** is your heart
- 5 The blood is **pushed** around your body
- 7 this **pumping**
- 11 No **man-made pump** is as reliable as your heart.

The gap between the sets of metaphors can be accounted for by taking account of a range of identification criteria. Firstly, if **pumping** is taken as metaphorical, then other forms of the root **pump** should also be taken as being metaphorical. While it is of interest to note that the adult subjects did not identify these as metaphorical, the logic of the theoretical level 1 identification procedure requires that they be included. This then adds to the basic set of 5 metaphors:

- 14 it **pumps**
- 16 your heart might ... **pump**
- 17 it .. **pumps** three times as much blood

Secondly, several of those identified as metaphorical by the adults in the test were initially discounted by the researcher on the grounds of being technical uses rather than metaphorical uses of words:

- 3 **chambers**
- 3 muscular **walls**
- 4 strong **tubes**
- 4 **squeeze** blood
- 4 **the walls contract**
- 6 the heart **relaxes**.

The adult subjects appear to perceive the transfer to a technical domain as being metaphoric. Perceived metaphoricity probably varies with domain-relevant experience, so that, for example, a group of doctors might not include these as metaphor at all. Since children are more likely to experience metaphoricity like the adults, rather than experts, this group was added to the original set of linguistic metaphors. **pump** and associated terms would then belong with this group, in that they are technical uses derived from a non-technical use. We can recall from Chapter 7 that Spiro et al (1989) mentioned such transfers from non-technical to technical domains as potentially troublesome for understanding, in a **similar** way to *energy - gases - light* in Text 1.

Thirdly, the researcher identified several verbs as linguistic metaphors because of an implied animacy or personification (as for the classroom data, Chapter 4, Section 4.10)

- 5 blood is **pushed**
- 6 blood **brought back** to it
- 10 your pulse rate **tells** you
- 15 the adjustments **are controlled by** nerves

Similarly, 12 it can beat...without a **rest** suggests personification of the inanimate heart. These were retained as linguistic metaphor.

I decided to keep 13 - the heart is **adjustable** - as linguistic metaphor because of its mechanical imagery. In fact, the sentence containing this metaphor was omitted from the GITA task because in the middle of carrying out the task, researcher and participants

were required to move to another room. The sentence was inadvertently left out when we resumed the task after the interruption.

The final metaphors in Table 9.2 above, **surging / surge** were not included as linguistic metaphor since I can identify no second domain sufficiently anomalous with the moving of blood.

The final set of linguistic metaphors comprises 23 linguistic metaphors (15 types; 23 tokens) shown in Table 9.3 below. The cross-checking revealed some interesting distinctions, and suggests that personifications, and technical uses with origins in other domains, constitute two further groups on the boundaries of metaphor. Including these uses as linguistic metaphor is a theory-level decision.

Table 9.3 Final set of linguistic metaphors identified in "The Heart"

1	Blood is the body's transport system
2	At the centre of this system is your heart
3	It has four chambers with muscular walls
4	the walls contract and squeeze blood out of the chambers and into strong tubes .
5	The blood is pushed around your body
6	As the heart relaxes blood brought back to it by other tubes
7	this pumping
10	your "pulse rate" tells you how fast your heart is beating
11	No man-made pump is as reliable as your heart
12	It can beat .. without a rest
13	the heart is adjustable
14	it pumps
15	The adjustments are controlled by nerves
16	your heart might ... pump
17	it ... pumps three times as much blood

9.2.2 Density of linguistic metaphors

The text is 227 words long, and with 23 metaphors, has a very high metaphor density of 101 metaphors per 1000 words. This is more than 6 times that found for classroom talk, and more than 10 times that given by Evans and Gamble (1988) for text-books. As discussed above, many of these are very borderline metaphors, but this high density does illustrate the reliance of the language of such texts, and by extension of the topic domains, on extended or transferred uses of words more familiarly used in other non-technical domains.

9.2.3 Form of the linguistic metaphors

The most reliably identified metaphor Blood is the body's **transport system** has the form $\{NP \text{ is } PossP. NP\}$, with the final NP as Vehicle, a variant on $\{NP \text{ is } NP \text{ of } NP\}$, familiar from the Ozone Layer Nominal Group metaphors.

There are 8 other nominal metaphor Vehicles:

- a rest
- the centre of this system (NP of NP)
- the adjustments
- walls
- tubes
- chambers
- pumping / pump

and one adjective: **adjustable**

The other Vehicles are verbs:

- pushed
- brought back
- pump (and variations)
- are controlled
- squeeze
- contract
- relax
- tells

As with the Ozone Layer text, and in contrast to verb metaphors found in talk, these verbs are schematic rather than indexical, with high lexical content.

Only 6 of the 23 linguistic metaphors have an explicit Topic mentioned in the text; the other Vehicle terms do not have Topic terms explicitly mentioned. This is mainly because of the large number of technical metaphors, for which other terms do not exist.

9.2.4 Graded features of the linguistic metaphors

G1 Incongruity

The **transport system** is highly incongruous with the domain of the body. The others much less so. When first introduced as a deliberate metaphor by William Harvey in the early 17th century, *the heart is a pump* would have had a high level of incongruity for users, between the part of the body and the machine used for pumping water from a well or spring. We have become so used to the metaphor that *pump* is now considered a literal use by many people.

G2 Novelty / Conventionality of Topic -Vehicle link

Despite its incongruity, the **transport system** is not an uncommon metaphor for the blood.

None of the other metaphors suggest high degrees of novelty, although this might well depend on the familiarity of readers with the Topic domain.

G3 Attitudinal Impact

transport system is a mechanical and fairly neutral as a term. The mechanical connotations are continued with **adjustable, controlled, pump**.

G5 Familiarity

Again, the Vehicle domains are likely to be broadly familiar to children, the Topic domain much less so. The concept of **transport system** domain is likely to be unfamiliar in its detail and organisation, and as we saw in the previous text, appropriate level of detail is an important feature of a Vehicle .

contract is unlikely to be familiar to children.

G6 Cognitive demand

The metaphorical analogy in the first two sentences seems at first sight straightforward enough, but is in fact quite complex, both linguistically and cognitively. Linguistically, the form is {NP is PossP. NP}, a more demanding, because potentially ambiguous, variation of {NP is NP of NP}. This is combined with the lexical choice of **transport system**, the cognitive demand of which can be measured along three dimensions:

1. level of abstraction: The Vehicle phrase **transport system** is abstract, comprised of nouns referring to abstract concepts, especially the head noun **system**

2. level of generality: **transport system** is a superordinate term rather than basic level - both as a phrase and the elements of the phrase

(compare an alternative phrasing: *blood carries food around the body just as lorries carry goods to the supermarkets*)

3. level of complexity: **transport system** = "traffic of various types together with the way their movement is organised" has many possible linking features, from which the reader has to select just those which are relevant to the Topic. The salient features in its metaphorical use are relational.

It seems the writer may be taking a risk in using such a metaphor to summarise the functioning of the blood. As the analysis of processing will show, this risk does not pay off and understanding is threatened as a result.

G8 Systematicity

The first two sentences show a local systematicity in the use of **system** and a rather tenuous lexical chain can be found linking this to some of the later Vehicle terms, also from mechanical domains:

transport system - centre of this system - pushed - brought back - adjustable - controlled

There is also a set of verbs connected with the action of the heart as muscle, some technical terms and some not, which are somewhat systematic:

contract - squeeze - pushed - relaxes

Global systematicity is evident in the use of **tells** to mean "indicates"; the use of terms from the Vehicle domain of spoken communication to refer to non-oral communication of information was found applied to the Topic domain of reading in the classroom discourse (Chapter 5, Section 5.10.3).

9.3 Information structure of the Heart text, and use of metaphor

This text has a more linear structure than the Ozone Layer text, with the first two sentences setting the scene for the rest of the text through the use of a nominal metaphorical analogy, which describes the role of the heart relative to blood and the body. This discourse framing role of nominal metaphor is similar to that of the nominal metaphors in the Ozone Layer text.

The blood is the body's **transport system**. At the **centre of this system** is your heart.

The remainder of the text goes into detail about different aspects of :

Sentence number

3	construction of the heart
4,5,6	how it works
7,8, 9, 10	heartbeats and pulse rate
Paragraph 2	
11,12,13,14	details about the heart as pump and how it varies
15	role of the brain in controlling heart beat
16,17	example of this variation - resting / racing

The **transport** aspect is thus not further developed; in fact, it summarises the functions of the blood described earlier in the book. The **system** element is developed by adding information about control of the system, detailed workings of the system and parts. The participants' knowledge of both Topic and Vehicle domains as they come to the text is,

as we will see, both incomplete and inaccurately organised, and would need strong restructuring to match the expert knowledge in the text.

The underlying metaphor of *the heart as a pump* does not appear explicitly, nor is it explained in the text. It underlies the description of the heart at work in the first paragraph, and then surfaces in the as an implicit metaphor in the negative comparison of sentence 11 which begins the second paragraph:

No man-made pump is as reliable as your heart.

From that point on, the verb **pump** is repeatedly used in various forms to describe the working of the heart.

9.4 Discourse support for comprehension of linguistic metaphors

9.4.1 Signalling metaphorical intention

The nominal metaphor **transport system** in the first sentence is marked by a combination of incongruity, rheme position, and text position in the first, topic, sentence, but has no explicit marker of metaphoricity.

The negative metaphor **No man-made pump** is discursively marked in a similar way in the second paragraph.

9.4.2 Supporting the understanding of metaphor

(1) Pre- and post-modification of Vehicles

There is no modification of verb or nominal metaphors, apart from the first metaphor and pre-modification of the technical nouns for the heart structure:

the body's transport system

four chambers

muscular walls

strong tubes

Each of these modifiers relates to the Topic domain.

Post-modification serves as explication - see (4) below.

(2) Repetition

There is repetition of 3 of the 15 Vehicle terms:

system

pump / pumping / pumps

adjustment / adjustable

(3) Relexicalisation

There is one example of relexicalisation of metaphor in the text:

squeeze / pump / push

(4) Explication

Between sentences 1 and 2, there is limited explication of the **system** metaphor Vehicle.

3 other instances of explication of metaphors occur, all using Topic domain terms:

- | | |
|--|-------------------|
| strong tubes , which are called arteries | (sentence 4) |
| other tubes , the veins. | (sentence 6) |
| This pumping , which we call a heart beat, ... | (sentence 7) |
| the heart is adjustable . It can beat faster or slower. | (sentences 13,14) |

The first three instances of explication above involve an explicit relabelling with a technical term which may actually be familiar to the reader and may thus help cataphorically with making sense of the linguistic metaphor.

Once again, the text provides only a limited amount of the type of help with understanding metaphor in comparison with that offered by classroom discourse. The reader is left very much to her / his own devices in making sense of the metaphors, some of which are central to the information structure of the text and others of which carry key technical meanings.

9.5 Participants' previous knowledge brought to the text and talk

As will be shown, the participants brought considerable knowledge to the reading of this text in the form of concepts and explanatory theories (Carey 1985). However, as with the Ozone Layer, this knowledge was incomplete and inaccurately structured, so that learning at some point would have to involve not just accumulating additional information, but also the restructuring of existing knowledge. As discussed above, the metaphor of the heart as a pump can be seen as an underlying metaphor that underpins and structures explanations of the circulation system. The pre-GITA discussion shows how the subjects' limited understanding of the Vehicle domain "pumps" constrained their understanding of the heart and also limited possibilities for developing this understanding. Secondly, at the level of text processing, the nature of the first metaphor, combined with the role of the metaphor in the text, contribute to a crucial early breakdown in understanding that means the text fails to provide the impetus to restructuring.

9.5.1 Analysis of knowledge brought to the text

Before reading the text, Ellen and Louise took part in a discussion about "pumps", the Vehicle of the metaphor of the heart as a pump, with three other children - Heather, Dougal and Marie - and the researcher, who initiated the discussion by asking for examples of pumps. One of the children raised the heart as a pump, and the researcher then guided the discussion on to how pumps work, what the heart does and why it is needed.

Following transcription, the contributions of each participant were put into columns, placing turns from left to right across the page in the order in which they occur and taking a new line where necessary to keep the order. Exchanges are bounded by the researcher's questions. Thus an individual's contribution can be scanned vertically, giving an impression of the structure of the knowledge they have articulated. My questioning as researcher attempted to pursue aspects of knowledge beyond the first offering, in many cases until the topic (or participant) appears exhausted, and to search out relational, as well as attributional, features of knowledge structures. The full column analysis can be found in Appendix 7.

Six types of pump were mentioned. Three involve the pumping of air:

bicycle pump
car (foot) pump
shoe pump

Three others pump liquids:

pump n spray (perfume)
petrol pump
water pump

Louise's statement in lines 30 and 32 (Appendix 9) that all the pumps involve air, is the first suggestion that, for her at least, the schema of how the heart works may include a role for the respiratory system. After the discussion between Heather and Louise on oil and perfume being forced up tubes by "pressure" (line 54), the theme of air is brought back again in connection with the heart and circulatory system (line 83 on).

Extract 29 below, from the column analysis, includes the part of the discussion on the function of the heart. This extract will be used to support my claim that, at this point, the children's schema linking the heart and blood system is inaccurate and therefore potentially open to restructuring through reading of the text.

Extract 29 From the pre- GITA discussion on "The Heart"

Researcher	Ellen	Dougal	Heather	Louise	Marie
(1) so what about the heart then?			(2) it pumps blood.. blood comes from all directions and it pumps it out again		(3) used blood comes in and it's reused again
			(4) in out in out ..it's like recycling it		(5) it goes out that way and comes in this way
(6) where does it send it to?				(7) all parts of the body to keep the body moving	
			(8) like petrol to keep a car moving like air to keep up bicycle tyres		
	(9) so when you die your heart stops beating and all the blood stops going round you			(10) then it's preventing you from moving .. people have to lift you up cos you just flop cos no blood's going round	
(11) why do you need blood to go round your body?				(12) cos if you didn't have it you'd just uuu while it's moving it's keeping	
		(13) feeds your bones			
	(14) has it got calcium in it?	(15) cos it mixes round with your food		(16) while it's going round it's helping you keep up	

		(17) it's warming you to move..well..n ot.. cos if you're freezing cold you can't move .. so it's warming you up		(18) it's like water when it's just come out of the tap it can move but if you freeze it it's just still	
(19) so it's like blowing something up?				(20) yea .. it gets right confusing	
(20) why?	(21) we don't know how to explain it			(22) cos we keep going round in circles	
(23) metaphor - ically speaking	(24) oh no..I said a metaphor				

(Tape 11: 175-215)

The function of the blood to "keep the body moving" seems to be an effect that is known to Louise (7), with a cause that is inaccurately understood. Heather produces two parallel analogies/ metaphors (8):

- | | | | | |
|---|--------------------|------------|----------------------|--------|
| 1 | (<i>blood</i>) | to keep | <i>the body</i> | moving |
| 2 | like <i>petrol</i> | to keep | <i>a car</i> | moving |
| 3 | like <i>air</i> | to keep up | <i>bicycle tyres</i> | |

The parallelism is of form and of lexis, although there is an important difference in meaning between *keep* and *keep up*. In each analogy there is a substance X in an object Y with a function Z (expressed using the lexical item *keep*). 2 is a potentially useful analogy, but is not followed up. 3., with the salient bicycle pump making a reappearance, is less helpful in that, while movement is an attribute of bicycle tyres, the air in the tyres has no function in the movement of the bicycle.

It is 3., however, that Louise seems to follow when she connects death with absence of movement of the blood via the observable signs of *flopping* (10), perhaps linking this with flat tyres. In her next statement, she restates this theory more directly: the function of the blood moving around the body is to prevent flopping and keep the body upright [6]. Her explanatory theory is formed in apparent ignorance of the role of blood in

transporting oxygen and nutrients to muscles that function *helping you keep up* (16), and while accounting for what she knows, makes an inaccurate, direct cause-effect link between blood circulation and being upright, when in fact the link is indirect.

It is worth noting that Dougal is the only one who seems to know that the blood "*feeds*" the body in some way (13). However, he also seems to have an inaccurate explanatory theory based on the metaphor of the blood *warming you to move* (17). Again, this is consistent with a fact he probably knows, that dead people are *cold* and immobile. Again, too, he makes a statement of cause and effect that fits his metaphor through extension of the Vehicle domain (coldness) but which is misleading - *if you're freezing cold you can't move .. so it's warming you up* (17) .

For Louise, existing knowledge about the domains of pumps and the circulatory system can be summarised as:

- pumps share the attribute of involving air, and one of the most salient pumps is a bicycle pump
- her explanatory theory of the circulatory system seems to make a direct link between the movement of the blood and keeping upright.

The underlying metaphor through which Louise seems to make sense of the circulatory system has a clear structure, and its explanatory theory is internally-coherent, and congruent with the facts as she knows. Ellen's contribution to the discussion is quite limited. She is the first to mention a bicycle pump and in the above extract, she brings in the fact that death includes the heart stopping and blood not moving. I conclude that her knowledge is limited, or, at least, she is not confident enough of it to articulate it.

Ellen and Louise's contribution to the GITA discussions will be examined bearing in mind what has been shown in this section about their previous knowledge of the t/Topic.

9.6 The potential of the metaphors for contributing to learning

Cognitive change would seem to require dismantling of the over-simple metaphor of the heart as bicycle pump, which in turn requires the recognition that the metaphor is inadequate. The text does not deal explicitly with the link between the respiratory and circulatory systems, which is where the children's knowledge needs restructuring. It does contain some information about how the brain interacts with the heart, with some use of metaphor - *adjustments / controlled*.

The transport system metaphor is not developed after the beginning of the text, so does not offer much in the way of a transferable domain that might contribute to learning. Analysis will show whether the text, and / or the metaphors within it, are effective in prompting cognitive change.

9.7 Noticing of the linguistic metaphors in the GITA task

The first level of evidence about metaphor processing is explicit noticing of linguistic metaphors as anomalous. Further analysis using the categorisation of utterances from Table 7.5 will provide further, indirect evidence of active metaphor processing.

5 linguistic metaphors are clearly noticed by the girls, as evidenced by explicit comment about a perceived anomaly. Two examples are given:

1. **transport system**

Both girls laugh:

L: it sounds like it something like there's a lorry or something riding (Tape 11-3: 7)

3. **walls**

L: walls is (.) quite a strange word to use for your body (Tape 11-3: 78)

1 is explicitly commented on as being non-metaphorical:

10. your pulse rate **tells** you how fast your heart is beating

E: that's true

L: yea

(Tape 11-3: 220-221)

The 4 metaphors relating to *pump* are not commented on, and are used by the participants in discussing the meaning of the sentence, e.g.:

L: so every second your heart's (.) pumping blood around (Tape 11-3: 174)

They are assumed to pass unnoticed, along with the remaining linguistic metaphors, which are not explicitly commented on.

More nominal metaphors are explicitly noticed in the GITA processing of the text than verb metaphors, in a similar pattern to the Ozone Layer reading. It is also of interest to note that, although the children had received some direct input about metaphor before this session, they did not label any of the noticed phrases with the metalinguistic term "metaphor".

I now proceed to report the results of analysis of the GITA protocols for the nominal and verb metaphors.

9.8 Making sense of the nominal linguistic metaphors

Unlike the Ozone Layer, some of the nominal metaphors in the Heart text presented serious interpretation problems to the girls. In each case, this was a result of lack of Vehicle and Topic knowledge, conceptual or at word level. Table 9.4 shows the categorisation of metaphor processing utterances in the protocols using the system of Table 7.3. Asterisks in the bottom row indicate those metaphors which were inaccurately interpreted by the girls; **adjustments** was interpreted only after intervention by the researcher, reported in detail in Section 9.11 below:

Table 9.4 Processing of the nominal metaphors in the GITA protocols - The Heart

Processing	<i>the body's transport system</i>	<i>the centre of this system</i>	<i>chambers</i>	<i>muscular walls</i>	<i>strong tubes</i>	<i>this pumping</i>	<i>no man-made pump</i>	<i>a rest</i>	<i>the adjustments</i>
1. Evaluation	XXY			X					
2. Metaphor Restatement	XX	XY	X						
3.1 Vehicle Explication	XXXX		XX	XX			XXX	X	X
3.2 Vehicle Repetition	X	XXXXY	XY	X	XY	XY		X	XY
3.3 Vehicle Relexicalisation	XY			X				X	
4. Vehicle Contextualisation							X		XY
5. Topic Development	XY	XXX		XY		XY	X	X	
6. Metaphor Construction	XXXX	X		X			X	X	X
7. Metaphor Reference		X							
INACCURATE INTERPRETATION	*		*	*					

It can be seen that there is variation in how the metaphors are processed, with the first two and **muscular walls** being processed with the use of nearly all the categories of processing, and others making use of just 2 or 3 categories.

The first metaphor needed two attempts at processing, and the girls were not happy with the final interpretation they produced, repeating their Metaphor Construction several times, as if to question it. This will be examined in detail below.

Clear evidence of metaphorical processing would seem, theoretically, to require an evidence of at least categories 3, 5 and 6. Four of the metaphors fulfilled this condition, although for 2 of these, inaccurate interpretations were reached.

An effect of linguistic form on processing can be seen when the two metaphors related to the Topic **pump** are compared. The negative metaphor **No man-made pump is as reliable as your heart** generated discussion around Vehicle domain examples of types of pumps. **This pumping**, on the other hand, was repeated in the talk, rather than being explicated or exemplified.

9.8.1 The role of previous Topic and Vehicle knowledge on processing

Topic and Vehicle knowledge works at two different levels to affect making sense of sentences containing metaphor. Knowledge about Topics mentioned explicitly in the text may be used to interpret specific metaphors, whereas knowledge in the form of the underlying metaphorically-structured schema of *the heart as a pump* may affect the interpretation of sentence metaphors and of the text as a whole. The effect of underlying Topic / Vehicle knowledge is reported in 9.1 below. In this section, I focus on knowledge about explicit Topic domains.

The gaps in Topic Development in the processing of *chambers*, *tubes* and *adjustments* reflect gaps in Topic knowledge, which prevented full understanding being reached. In the protocol for *muscular walls*, gaps in Topic knowledge meant that although Topic Development did take place, it was inaccurate, and left the girls with an incomplete understanding of the metaphor. Extract 30 shows the protocol for the interpretation of *muscular walls*. This was somewhat reluctantly included as a linguistic metaphor by the researcher, after 71% of the group of adults used for cross-checking identification had included it. From the protocol, it would seem that the girls were unfamiliar with the word *walls* used for a part of the body (line 3) and did indeed try to process it metaphorically as a strategy for dealing with an unfamiliar word.

Extract 30 From The Heart GITA protocols: Sentence 3

1	L: muscular walls
	E: oh the heart has four chambers with muscular walls (.) to protect it probably
	L: muscular walls (.) walls is (.) quite a strange word to use for your body (.)
	E: could be your ribs (<i>laugh</i>)
5	R: mmm
	L: cos your ribs (.) protect your
	E: [your ribs aren't like a wall though
	L: yea
	R: what's a chamber?
10	L: it's like (.) it sounds like a dungeon
	E: I always think of a
	L: things are stored
	E: I always think of like a big (.) sort of (.) chamber y (.) ri (.) like Louise ca
	R: like what?
15	E: like Louise um thinks of it
	R: like a dungeon?
	E: yea (.) sort of sounds (.) like it
	R: so what's muscular mean? (2.0)
	L: sounds as though it's like all your (.) muscles and
20	E: [strong
	L: things put together (.) it's a very strong wall

(Tape 11-3: 76-96)

The protective function of the **walls** is mentioned first (line 2), and then a Topic *ribs* is suggested for the **Vehicle walls** (lines 4 and 6). In a kind of negative Metaphor Construction, Ellen then dismisses this metaphorical interpretation in line 7, and attention turns to **chambers**. There is less evidence for this word being processed metaphorically, since nothing is suggested that could be a Topic. The word is explicated and reformulated in lines 10-17. At the end of the protocol, the researcher directs attention to *muscular* and the girls produce *strong* as a synonym that also collocates happily with *wall*.

After the GITA task, the girls and researcher looked at the pictures in the book and Ellen asked

can you answer me one thing? what are the four chambers? what have they got in them?

(Tape 11-3: 429)

confirming her lack of Topic knowledge. This combines with lack of knowledge about **walls** of the heart to lead to an inaccurate interpretation.

- What is of interest is the evidence of active metaphor processing, used as a strategy to make sense of **walls**.

9.8.2 Metaphor construction via metaphor

The Metaphor Construction process around the metaphor in

It can beat for 100 years or more without a **rest** (Sentence 12)

was done metaphorically, using a different Vehicle:

Extract 31 From The Heart GITA protocols: Sentence 12

E: even when you're sleeping your heart's beating (.) so (.) you're just like (.) your just like
L: [your heart (.) you're never
E: you're just like <u>recharging your batteries</u> (.) when you sleep
(Tape 11-3: 252-255)

The relexicalised Vehicle is from a quite distinct domain, and with the use of *you .. your...you* resembles Vehicle Contextualisation. Suggesting an alternative metaphorical formulation of the writer's idea in discussing a text reflects, too, the negotiation of metaphor in classroom discourse through the positing of alternatives (Chapter 5, Section 5). This is one way in which multiple metaphors can be used interactively to clarify thinking.

9.8.3 Analysis of the processing of nominal metaphor 1 - "the blood is the body's transport system"

Detailed analysis of the **transport system** metaphor and its processing is of interest because the protocol reveals some of the causes of the participants' failure to make sense of the metaphor.

1. The blood is the body's **transport system**.

The Topic is The blood in the domain of human biology; the Vehicle is **transport system**, pre-modified by the Topic term, the body's. The (assumed) intended interpretation of the metaphor/analogy is that, just as a transport system carries goods or people around a town or country in an organised way, so the blood carries oxygen, nutrients, hormones etc around the body pumped regularly by the heart and controlled by the brain. The complexity of the analogy is mostly unstated i.e. it relies on the reader bringing knowledge of what the blood carries, and what controls the **system**, to the text. The protocol shows what happens when such Topic knowledge is not brought to the text - the metaphor is worked on quite competently, but there is no way the intended interpretation can be reached. I shall attempt to show through analysis that the sentence is interpreted metaphorically, but that the interpretation is strongly constrained by the participants' previous understanding of the nature and function of the circulatory system as displayed in the pre-task discussion.

The ambiguity that arises from the linguistic form of the metaphor adds to the confusion; the Possessive relation [*X's*] here indicates "located within X", as with *London's transport system*, rather than "used for transporting X" as in *the school children's transport system*. The ambiguity generated by the form of the metaphor contributes to the problems it generates; knowledge of the Topic domain is required to disambiguate and generate an appropriate interpretation.

The metaphor has further potential power in its use of the complex Vehicle *system*, with the implication of feedback, control and regulation that could be linked to the hormones released by the brain, as mentioned later in the text. However, the protocol of this sentence, and of sentence 2, shows this sense of **system** is not applied to the interpretation of the metaphor. This could be due to lack of Vehicle knowledge - the complex concept of *a system* - or to lack of Topic knowledge - their schema includes the heart as central but does not appear to connect the brain with the circulation of the blood, or, most likely, a combination of gaps in both Vehicle and Topic knowledge.

Evidence for lack of Topic knowledge, as far as Ellen is concerned, is provided in the following quote from the post - GITA discussion:

E: I've realised that it needs your..brain to connect with your heart...I just thought it was your heart a separate thing from your brain (Tape 11-3: 396-397)

In the protocol, the participants articulate two interpretations of the sentence, neither of which coincide with the intended interpretation. Their first interpretation matches with their existing knowledge structures; the second clashes with it and is put forward with reluctance in order to take on board the need to link the linguistic form of the sentence with meaning.

The three interpretations involved can be summarised as :

1. the writer's intended interpretation *blood transports things around the body*
2. the participants' initial interpretation *something (like traffic) is taking blood around the body*
3. the second attempted interpretation *the blood is taking the body round*

A close analysis of the protocol (Extract 32) shows that the pattern of processing follows that of the simpler metaphors met in the Ozone Layer text, with Metaphor Restatements followed by Vehicle Development and Metaphor Construction.

Extract 32 The Heart GITA protocols: Sentence 1

	Utterance	Metaphor process
1	L/E: (<i>in unison</i>) transport system	3.2 VEHICLE REPETITION
2	(<i>laugh</i>)	
3	L: it sounds like it something like there's a lorry or	3.1 VEHICLE EXPLICATION
4	something riding	
5	E: lorry taking like a load of bulls or something	3.1 VEHICLE EXPLICATION
6	L: yea	
7	R: is that is that a good idea that it's (.)	EVALUATION PROMPT
8	E: can we look at page 16?	
9	L: it's it's	
10	R: no (.) I haven't got page 16 at the moment	
11	L: it's it's a good way of explaining it (.)	1. METAPHOR EVALUATION
12	but it sounds as though there's like (.) traffic	3.3 RELEXICALISATION
13	driving about in you	
14	(<i>laugh</i>)	
15	R: and don't you like it to sound like that?	EVALUATION PROMPT
16	L: it's a good way to explain it but	1. METAPHOR EVALUATION

17 18 19	E: it's a good way because like traffic drives things around (.) and that sounds like it's taking all the blood round your body (.)	3.1 VEHICLE EXPLICATION 6. METAPHOR CONSTRUCTION
20	so that's quite a good way of (.) explaining it	1. METAPHOR EVALUATION
21 22 23	R: well it (.) right (.) so so (.) but it says blood is the transport system (.) so the blood is the lorries L: yea (.) blood is the body's transport system (1.0)	DIRECT INTERVENTION 2. METAPHOR RESTATEMENT
24	E: to keep your body going	3.3 VEHICLE RELEXICALISATION
25 26 27 28 29 30 31	L: so that means that lorries and that are dri (.) it sounds as though lorries and things are driving your blood around to take it to like your arms and fingers and things E: yea but L: although it's not really E: it doesn't say	3.1 VEHICLE EXPANSION 6. METAPHOR CONSTRUCTION 5. TOPIC DEVELOPMENT
32	L: it's running through your veins and that	5. TOPIC DEVELOPMENT
33 34	E: it says the (.) blood is (.) blood is taking the body round though (.) sort of thing (.) cos it's	6. METAPHOR CONSTRUCTION
35 36 37 38 39	L: blood is E: blood is the body's transport system (.) so R: mm (.) so? E: you put it in a different way there (<i>laugh</i>) R: so (.) what does that mean to you?	2. METAPHOR RESTATEMENT UNDERSTANDING CHECK
40 41 42 43	E: um (1.0) the blood's making the body go round instead of (.) the body um (.) instead of the (.) trucks taking the blood around (.) R: right OK I see what you mean	6. METAPHOR CONSTRUCTION

The initial interpretation is reached in lines 18 and 19, and repeated in lines 25-28, although with some reservations expressed by Louise (lines 12 and 16). I intervene at lines 21-22, and re-read the sentence, emphasising the Topic-Vehicle link (*blood - transport system*), thus indicating that the girls' initial interpretation is inaccurate. This marks the beginning of a second phase in which they work towards a different interpretation, apparently perceived as unlikely, but which seems to be the only possibility if the form is to be taken into account. The intended interpretation does not seem to be available to them at any point.

The first interpretation is reached through development of the Vehicle *transport system* via explication:

like there's a lorry or something riding

(lines 3/4)

lorry taking a load of bulls or something (line 5)
traffic driving about in you (lines 12/13)

and formulated as a metaphor

traffic drives things around and that sounds like it's taking all the blood round your body (lines 17/18)

Thus the original Vehicle has been reduced from *transport system* to one aspect of this *traffic* and to a specific example *lorries*. The Vehicle Explications exemplify two salient aspects of the Vehicle - the movement of some kind of vehicle, and the carrying of goods by the vehicle. The intended interpretation would be reached if these were matched on to *the blood* and *oxygen, food etc* respectively. However, in this initial interpretation, the goods carried are linked to *the blood*, and *traffic* is linked to *it*, which remains unidentified as any element of the Topic domain. There is no mention at all of the Topic domain knowledge that oxygen etc is carried by the blood. Displaying this diagrammatically:

VEHICLE(intended)	=====	TOPIC
transport system	-----	blood (cells)
what's carried	-----	oxygen etc
location of transport system	-----	body
system (roads)	-----	circulatory system (arteries/veins)
control of system	-----	brain, nerves, hormones
movement	-----	pumping

1st interpretation:

VEHICLE	=====	TOPIC
lorries, traffic	-----	it('s) / containers for blood
a load of bulls or something	-----	blood
you	-----	body
driving	-----	taking around the body

At this point, the first stage of interpretation is finished as the adult intervenes to point out that this interpretation does not fit the text sentence, and explicitly links *blood* with *lorries* as a clue to a more appropriate interpretation. Louise repeats the first interpretation in line 25-28 before regretfully putting it to one side in line 30 and withdrawing from the talk after a Topic Development statement - *it's running through your veins* that sounds like an attempt to find further possible links. Since they do not have available *oxygen etc* to match on to the *things carried* aspect of the Vehicle domain, the only possible match is *the body*, and Ellen proceeds to try this out in the next Metaphor Constructions of lines 33-34 and 40-42:

blood is taking the body round
the blood's making the body go round

The second of these is contrasted with a restatement of the first interpretation - *trucks taking the blood around*. This interpretation uses the alternative sense of the possessive, and, although it fits the syntactic form of the text sentence, is much less rich than the first, as well as being nonsense:

2nd interpretation

VEHICLE	=====	TOPIC
lorries, carrier	-----	blood (cells)
--	-----	oxygen etc
what is carried	-----	body
--	-----	circulatory system (arteries/veins)
--	-----	brain, nerves, hormones

The reluctance of Ellen to actually put this into words (lines 38, 40-42) suggests that she is well aware that it does not make sense.

A syntactic analysis shows parallelism of form between the interpretations, and the shift in Subject / Object reference. The intended interpretation transformed into SVO:

S	V	O	A
<i>blood</i>	<i>transports</i>	?	<i>around the body</i>

The subjects' first interpretation:

S	V	O	A
<i>lorries</i>	<i>take</i>	<i>blood</i>	<i>around the body</i>

The subjects' second interpretation:

S	V	O	A
<i>blood</i>	<i>takes</i>	<i>the body</i>	<i>round</i>

The Topic/Vehicle analysis shows the gap in the Vehicle domains as processed that would connect with "oxygen etc", and syntactically it can be seen that both *transport* and *take* are transitive, with the knowledge gap lies precisely in the Object of the verb - the girls do not know that the blood carries oxygen, hormones etc. as was suggested by the pre-GITA discussion analysis in 9.5.1

(1) Role of Topic and Vehicle knowledge in making sense of Metaphor 1: summary

Without the adult intervention and subsequent imposed focus on the exact linguistic form, the children would probably have remained with their first interpretation, which

matched their previous knowledge/ schema of blood moving around the body. Indeed, they probably do remain with it, despite the intervention. Problems in interpretation are not caused by a lack of skill in metaphor interpretation, through Vehicle Development and Metaphor Construction, but by the nature and extent of the knowledge of the Topic and Vehicle domain brought to the text. The metaphor fails to develop their existing knowledge because that existing knowledge fails to provide enough information to disambiguate the metaphor. The precise element of missing Topic knowledge has been identified by the analysis as the fact that the blood carries oxygen and nutrients around the body.

- ♦ A function often claimed for metaphor and analogy is that they explain the new in terms of something already known. Once again, however, we see the limitations of metaphor use in such situations, where the choice of metaphor made by the writer requires a certain threshold of knowledge about the new or Topic domain, as well as the Vehicle domain, in order to interpret the metaphor and increase existing knowledge.

(2) Topic Reference Shift and inaccuracy in interpretation of Metaphor 1

As in the previous chapter where metaphors in use were seen to be working with a degree of inaccuracy, so, in the first interpretation, linguistic form seems to act as a little more than a guide to meaning generated by key lexical items and there is a shift in Topic reference. While the linguistic form encodes quite precisely the relations between these items, the processing seems to work at a more approximate level. As expert users of language, the participants start by making a rough but plausible match between their understanding and the sentence, using syntactic information at the level of clausal elements. It is not until forced by interpretation breakdown that phrasal elements receive attention.

- ♦ The "loose" (Wilson and Sperber 1992) interpretation of metaphor is held to be characteristic of language processing in general; what we begin to see evidenced is the nature of that looseness in the attachment of meaning to clause elements and in the shifting of clause element reference.

9.9 Interpretation of the verb metaphors

Table 9.5 shows the categories of Table 7.3 applied to the protocols of sentences containing verb metaphors. As with the Ozone Layer text, far fewer categories can be assigned to the verb metaphor protocols, suggesting that processing of verb metaphors

differs in nature from that of nominal metaphors. On the whole, the verb metaphors are interpreted with more success than the nominal metaphors.

Table 9.5 Processing of Verb metaphors in the GITA protocols - The Heart

Processing	<i>contract</i>	<i>squeez e</i>	<i>pushed</i>	<i>relaxe s</i>	<i>brought back</i>	<i>tells</i>	<i>pumps</i>	<i>are controlled</i>
1. Evaluation					x			
2. Metaphor Restatement				x				
3.1 Vehicle Explication			?xx					
3.2 Vehicle Repetition							xx	xx
3.3 Vehicle Relexicalisation	<i>break up lets it through</i>	<i>pump</i>		<i>stops</i>				
4. Vehicle Contextualisation								
5. Topic Development			xx		x			
6. Metaphor Construction		x	x		xx			
7. Metaphor Reference								
UNSUCCESSFUL INTERPRETATION	*							*

9.9.1 Non-metaphorical processing

As pointed out in Section 6. above, **tells** was not processed metaphorically at all. **contract** was an unknown word, relexicalised as *do they break up or something?*, which would fit with the Subject **walls**, in the non-technical sense familiar to the participants. It was not processed as a metaphor.

9.9.2 Role of previous Topic and Vehicle knowledge

There are gaps in Topic and Vehicle knowledge of **contracts**, and in Topic-knowledge related to the **controlling** of the body through the nervous system, that prevent understanding of two of the verb metaphors.

9.9.3 Metaphor construction via metaphor

Part of the protocol for sentence 6:

As the heart **relaxes** again, it fills with more blood **brought back to** it by other **tubes**,
the veins.

is shown in Extract 33. As the girls reconstruct the meaning of the sentence, which acts as a Frame for the two metaphors, they use two further metaphors - *recycled* (line 9) and *like a big circle* (line 14):

Extract 33 From The Heart GITA protocols: Sentence 6

- 1 E: so it's saying like the heart does ...
L: as the heart (.) s
E: it pumps then it stops then it pumps then it stops (*laugh*)
R: ahha
- 5 L: as its doing (.) as it stops (1.0) it's being filled with more blood brought
E: so the next time it pumps it'll go (.) all round again
L: [brought
yea
E: it's gonna be recycled (3.0)
- 10 L/E: ???
L: go down your arteries (.) come back round through your veins and then back round again
R: right
L: so it's
E: [it's just like a big circle
- 15 L: that's quite good explaining isn't it?

(Tape 11: 144-158)

In the final line, Louise presents a Metaphor Evaluation, which might apply to Ellen's metaphor or to their understanding of the sentence as a whole. The term *recycled* was also used by Heather in the pre-GITA discussion.

In the protocol of Sentence 16, a further metaphor is used in the Metaphor Construction phase of processing:

E: you're jogging and your blood's jogging (Tape 11-3:338)

9.9.4 Topic Reference Shift and (in)accuracy in verb metaphor interpretation

Protocols of 4 of the 6 verbs processed as metaphors display a shift in the Subject or Object reference of the verbs:

Topic Reference Shift 1

the walls ... squeeze blood out of the chambers... (Sentence 4)

The plural Subject (*walls*) becomes singular (*it*) as the protocol moves on, with the researcher being responsible for the first shift:

L: squeeze blood out (.) I thought it would be more like (.) pump blood out
(Tape 11-3: 103)

...
R: ... it squeezes it out (Tape 11-3: 111)

...
L: blood's all stored in the er chambers that's being protected and then it's squeezing blood out into strong tubes (Tape 11-3: 124-125)

No explicit noun is given to match the singular pronoun *it's*; an obvious candidate would be *the heart*. The shift is from the more specific, part (*walls*) to the more general, whole (*heart*).

Topic Reference Shift 2

The blood is **pushed** around your body. (Sentence 5)

In the text sentence, there is no explicit Agent responsible for the pushing. When the researcher asks the girls what is pushing the blood, they suggest it might be *air / oxygen / the pumping / action of your heart*, and Ellen finally reformulates the sentence as:

E: it's giving it all (.) s giving it all the air to move round. (Tape 11-3: 140)

This shift in the (Topic domain) Agent of **is pushed** would seem to be the result of conceptual confusion. Once again, however, it seems that the use of a verb metaphor loosens the semantic link with the Subject / Object, or in this case, implied Agent, that belong in the Topic domain.

Topic Reference Shift 3

It can beat faster or slower, and changes how much blood it pumps with each beat... (Sentence 14)

In this original sentence, the pronominal Subject *it* of the verb **pumps** refers to *the heart*. In the protocol, the Subject becomes *blood*:

L: your blood's pumping more faster (Tape 11-3: 265)

E: ... you don't need all that blood pumping through you ... (Tape 11-3: 267)

In this instance, the verb appears to be "ergative", and to permit the shift of Object (*blood*) into Subject position without altering the sense of the sentence. Given other evidence in the protocols, it is likely to be significant that the role of *the heart* in pumping is, in this shifting process, backgrounded.

Topic Reference Shift 4

The adjustments are controlled by nerves from your brain and by hormones. (Sentence 15)

The **adjustments**, initially mentioned in the previous sentence, are the change in the rate of beating of the heart. The children did not understand *hormones* and this was explained by the researcher. After the explanation, the girls summarised their understanding. Two Topic Reference Shifts can be seen in these explanatory sentences. This original Subject

of *is controlled* (The adjustments) shifts and the Subject becomes *your body*. The original Agent (nerves and hormones) shifts to *your blood*:

L: it's mainly your body cos it's controlled by your nerves (Tape 11-3: 319)

E: your blood's (.) all controlling your body (.) so when (.) your brain sends messages to your blood then (.) that controls your body (Tape 11-3: 322-323)

Neither of the resulting sentences is actually wrong, but they lack precision in describing the mechanisms that are being learnt about. The potential precision offered by the text has been lost.

- ♦ Topic Reference Shifts are thus again evidenced in processing, and in isolation, none of them would give great cause for concern. The cumulative effect on the readers' understanding, however, may be more worrying, particularly when combined with inaccuracies in understanding due to gaps in Topic knowledge.

9.10 Making sense of the text

Having seen how interpretation at sentence level can go wrong, in this section I focus on the understanding of the text as a whole. As seen from the pre-GITA discussion, the participants' existing knowledge had potential for change, in that there were gaps and inaccuracies in their schemata. The underlying metaphorical schema of the heart as a pump appears, in particular, to be inaccurate. Tracking through the protocols provides further evidence of how the participants' underlying analogy of *pumping*, influenced interpretation of the text and opportunities for cognitive change or learning.

9.10.1 The underlying metaphor of the *pump*

Examination of the processing of the text sentences under GITA conditions shows how participants' previous knowledge seems to contribute to further explanatory inaccuracies based on a conflation of the respiratory and circulatory system. The participants' preferred Contextualisation of the Vehicle *pump* is as the familiar bicycle pump. The activation of this sense of *pump* is not surprising when the children's likely personal experience with pumps is considered. Furthermore, the elements of the *bicycle pump* Vehicle domain and the explanatory theories within the Vehicle domain seem adequate to take account of, and map on to, the children's current level of knowledge of the *heart* Topic domain:

BICYCLE PUMP	=====	HEART AND CIRCULATION
pumping air in	-----	breathing in and out pushes blood around
air keeps tyre up	-----	blood keeps the body up
no air - flat tyre	-----	death - floppiness - no breathing

A further aspect of their real world experience - that running makes you puff and pant, and get hot - can also be made to match the bicycle pump, which gets warm if you pump really hard.

Further evidence that the underlying metaphor is active in this form comes from the protocol analysis. In the first extract (34 below) the researcher probes the source of movement of the blood, which has been explained in the previous text sentence. However, the girls did not understand *contract*, nor did they realise that the heart is a muscle that works to push the blood around. They are thus forced back on their existing schema, in which the air forces the blood around (lines 5 and 11), presumably in some direct connection between breathing and blood moving:

Extract 34 From The Heart GITA protocols: Sentence 5

1	L/E: (<i>read</i>) the blood is pushed around your body
	E: we realised that (<i>laugh</i>)
	R: what's pushing it?
	(3.0)
5	L: is it air? <u>oxygen</u>
	R: mhmm
	E: it's the pumping
	L: yea the heart (.) sort of (.) um
	E: it's giving it all
10	L: [action of your heart
	E: it's giving it all (.) s giving it all the air to move around
	(Tape 11: 130 - 140)

The direct link between breathing and the pumping of the heart moves nearer to being explicitly stated in the next extract (35)

Extract 35 From The Heart GITA protocols: Sentence 7

R: and what (.) how's it doing it? (3.0) how's it pushing this blood around? (3.0)
E: cos you <u>breathe in air</u> (.) and then breathe it out <u>again</u>
(Tape 11:184-185)

Several problems arise when the participants read about how the heart beats at different rates depending on the level of activity required. These processing problems and how they were resolved are examined in detail below. At this point, I would like to highlight how additional Topic domain knowledge does not lead to the collapse of the inaccurate analogical schema, but seems to be accommodated within it, demonstrating weak rather

than strong restructuring. In Extract 36, Ellen makes sense of the increase in heart beat when running:

Extract 36 From The Heart GITA protocols: Sentence 16

- 1 E: lots of (1.0) and it must beat a lot of times when you're like (.) running (.) because if it's 60 to 70 times a minute (.) when you're resting (.) just to make the blood go around to keep you alive (.) then (.) and keep you warm (.) when it's (.) when you're (.) running (.) I know why you get so hot now (3.0)
R: can you work out why you go red as well when you're running then?
L: it's all your blood
5 E: [cos of all your blood (.) jogging round
(laughs)
E: you're jogging and your blood's jogging (laugh)
- (Tape 11:330 - 338)

Further evidence for the bicycle pump as underlying, and unchanging, metaphor comes from examples offered by the girls during the GITA task. The text sentence 11 states

No man-made pump is as reliable as your heart.

As can be seen in Extract 37, this prompts two examples of man-made pumps from the girls, each of which has air as a major component

Extract 37 From The Heart GITA protocols: Sentence 11

- 1 L: [no man made pump is as reliable (.) as (.) your heart (1.0) it's like (.) heh (.) um big air pumps (.)
E: [bike
L: that's not as (.) reliable
E: [your bike (.) your bike pump might last longer than your heart but (.) it's
5 L: um (1.0) same those bags of air type things they put on you when you're in hospital (.) if you're having breathing difficulties (.) it's still not as (.) working as good as your heart (1.0) all that that it's (.)
E: [it's just helping your heart
L: still giving you air but (.)
10 E: it's just helping your heart
L: [it's not giving you as much
(laugh)
- (Tape 11: 226 - 239)

The first example is the perennial bicycle pump; the second, of hospital air bags, appears to come from personal experience, and shows how observation of the movement of air in and out of the body may be mistakenly aligned with the pulse rate or heart beat. The

inaccurate schema, in which *giving air* is *helping your heart*, accounts adequately for the children's current experience and knowledge, and so persists.

If the girls' understanding of how the body works is restricted, in the ways that seem plausible from the above evidence, then they would need to add to their understanding the following information and explanation:

- the blood carries oxygen and nutrients in the blood cells
- blood is pumped by squeezing of muscles in the heart
- blood is pumped through the lungs where it collects oxygen
- oxygen gets into the lungs by breathing, and is transferred to the blood through the bronchial tubes

Adding these understandings to their existing knowledge would require "strong restructuring" (Carey 1985) through adding to existing categories (e.g. *blood cells and what they carry*), the introduction of new categories or dividing up existing ones (e.g. *separating the respiratory from the circulatory system*), and the revising of explanatory theories (e.g. *how the blood cells collect and deliver oxygen*). It is likely that such major change in conceptualisation would be resisted until the evidence was overwhelming. Clearly this text does not provide sufficient information to tip the balance; existing theories can deal with the new information. One aspect - the role of the brain in controlling the heart - is restructured, as will be shown later. In this case, it is not just the text processing that seems to lead to this successful cognitive change; the interaction with the researcher, and the mediating use of metaphors in this interaction, seem to play a key role.

- While the strength of existing conceptualisations resists the impact of new information from the text, it also works more strongly in some instances, constraining the processing of the text sentences and producing continuing inaccurate interpretations.

9.10.2 Summary of problems that affect making sense of the text as a whole

As shown in 9.10.1 above, it is likely that the underlying inaccurate metaphor of the pumping of the heart as somehow directly connected to the respiratory system persisted throughout the reading, and was not altered by contact with the text. In this way, the second text was more problematic than the first. However, when assessed at sentence level, the text appears less problematic than the Ozone Layer, with only 5 of the 17 sentences causing interpretation problems; the participants were explicitly aware of all of

these. Two other sentences (5 and 7) were interpreted successfully at a superficial level, but with inaccuracies at a deeper level of the underlying concept of air pushing the blood around.

The sources of the problems were as in Text 1:

- ~ from the use of words unknown to the children
chambers, walls, contract, hormones
- ~ lack of background knowledge which the writer assumed of the reader
about *the connection between respiratory and circulatory systems*
- ~ some complicating aspect of text or sentence structure
e.g. Anaphoric references of "this system" (Sentence 2) "it" (Sentence 3)

More than one source of problem might operate simultaneously.

9.11 Mediation of metaphor: an example of successful restructuring of knowledge

After completing the GITA task, Ellen offers this account of her concept restructuring;

Extract 38 Ellen describes her revised understanding, post-GITA

I've realised that it needs your brain to connect with your heart...I just thought your heart was a separate thing from your brain...that you didn't need your brain to like make your blood go round...I just thought your brain moved your arms and hands and everything.. and your blood just went round you and did nothing

(Tape 11-3: 396-401)

The prompt for this was the interaction between Ellen and the researcher over the text sentence 15:

The adjustments are controlled by nerves from your brain and by hormones.

The interaction between researcher and participants is analysed here in order to isolate features that lead to successful use of metaphorical language in restructuring of incomplete and inaccurate concepts, and to show how adult mediation can play a role in this process.

The relevant exchange begins in the middle of the protocol for sentence 15, when the researcher asks the participants' about the word/concept "hormones"

R: do you know what hormones are?

E: no

L: are they cells in the brain or something?

(Tape 11: 294-296)

It is then clear that the girls do not know what hormones are and how they work through the blood stream, and the researcher (spontaneously) explains. Analysis of the

spontaneous explanation reveals the use of the mechanisms for supporting understanding that were observed in the classroom discourse (Chapter 6, Section 6.3.5.), but which were lacking in the two written texts. The discussion proceeds as shown in the extract below, with the researcher's metaphor (line 5) appearing to prompt Ellen to find and develop her own metaphor (line 7) that she can then develop through explication, exemplification and contextualisation, as seen in the processing of the Ozone Layer nominal metaphors. The protocol finishes with Ellen producing a Metaphor Construction statement (line 16) to display her understanding of the text sentence.

*Extract 39 Mediation of metaphor through metaphor: from The Heart GITA
protocol of Sentence 15*

	Researcher	Ellen	Categorisation of utterance
1	they're chemicals go round		Topic development
2	in your blood	oh	(definition)
3	come from different parts of your		Expansion of definition
4	body and do different things		Use of Metaphor to explain
5	they're kind of like switches		function (Vehicle = switches). Vehicle Repetition + Development and link to Topic domain
6	they switch things on and off in your		
7	body	oh right so your brain	
8		communicates to those and then it can say =	E. introduces related metaphors with relexicalised Vehicle (Topic = controls; Vehicle = communicates / say)
9	yea..if it releases some of these		Topic development - to
10	chemicals	= move my legs really fast	explain function Vehicle Contextualisation by E.
11	yea ... if something scary's happening		Attempt by R. at
12	you feel ...inside you..you go like that		contextualisation
13	that's a hormone coming out (.)		including: use of new Topic
14	a chemical going out in your blood		term, repetition and
15	stream (.)		relexicalisation
15	gets you ready to run away		End of contextualisation
16		like yesterday when we did sports practice	Reciprocated contextualisation

17	(series of comprehension checking questions)	so when your brain sends messages to your blood then that controls your body	Use of E's own metaphor to construct interpretation of role of hormones and text sentence. Vehicle Relexicalisation. Metaphor Construction.
----	--	--	---

(Tape 11: 299-323)

The negotiation of meaning in this exchange takes place through the negotiation and convergence of metaphors, as in the Volcano extract in Chapter 5 and as in Roschelle's study of cognitive change (Roschelle 1992). In this exchange, Ellen produces 4 metaphors which serve ideational functions for her

- to summarise the idea described by the adult in her own way
- to reformulate the idea in parts and as a whole

The production of the metaphors also offers the opportunity for the adult

- to check the accuracy of her understanding
- to offer feedback.

The exchange includes examples of all the mechanisms of support identified in Chapter 5:

- post-modification of Vehicle (*switches things on and off*, line 5-6)
- repetition of Vehicle and metaphor (*switch*, lines 5 & 6 ; *controls*, line 17)
- relexicalisation of metaphor (*switch on and off - communicate - say - send - messages*)
- explication of metaphor through Vehicle elaboration / expansion / exemplification (lines 6; 8; 11)

The Topic development at the beginning of the extract can be seen as creating some solid ground of shared understanding from which to construct the "bridge" of metaphor into new understanding (Kittay 1987: 269). In addition, several metaphors are used by the adult, creating "multiple analogies", which complement each other to narrow down possible meanings towards understanding (Spiro et al 1989). The Vehicle of the metaphor *switch* refers to just one key aspect of the Topic domain, the function of the hormones. Other Vehicles *communicate / send messages* refers to a further aspect of the Topic domain, how the function is carried out. The initial, general level, metaphor *controlled* is thus broken down by the subsequent metaphors introduced in the exchange into more specific aspects of the Topic, and reconstituted at the end of the exchange. In this way, Topic knowledge is built up from the starting point of existing knowledge by the series of metaphors. The initial metaphor in the text would have failed to promote learning because the existing Topic knowledge did not allow it to be made sense of, and

the text did not offer the Vehicle-related assistance to comprehension that was provided by the negotiation of meaning.

The exchange in this particular protocol serves to illustrate how mediation of and through metaphor can be fine-tuned to the children's understanding. When compared with the (un-mediated) struggle of the girls to make sense of the metaphor of the *transport system*, it emphasises the gap between written and spoken discourse in terms of ensuring understanding.

9.12 Analysis of knowledge about the Heart from the post-GITA discussion

As mentioned in Chapter 7, Section 7.10.1, data collection constraints meant that only a brief post-GITA discussion on the Heart text could take place immediately after reading. Section 9.11 above discussed the cognitive change that took place as a result of the researcher's intervention on the concept of *hormones* and *control*. The other aspect of interest in the immediate post-GITA discussion, was the mentioning by the girls of a perceived change in difficulty level in the text when they reached the second paragraph, when more specific detail is included:

Extract 40 The Heart: evaluation of the text, post-GITA discussion

1	R: cos we had the same thing with the ozone layer didn't we? do you remember? (.) that was hard at the beginning and then it got
	L/E: [oh yea
	E: because when it told (.) when it you when it told (.) cos Louise was amazed (.) at how
5	(.) the height was =
	L: [it is easier once when you read it all
	E: = and it's good here when it says 60 or 70 times a minute
	R: so it's as if this first paragraph is kind of the technical detail isn't it? (.) but when it gets
10	into real life
	L: [it's (.) just sort of telling you what happens and <u>that</u> feels like more like real life
	R: yea (.) it relates more to what you know about what you know=
	L: [cos it's talki
15	R: = about (.) whereas this is (.) the biology of it (.) the science
	L: [yea it's yea it's talking about like when you run races and all that so it's helpful

(Tape 11: 356-371)

As with the previous text, the figures appeared to be striking, and non-metaphorical, information that was recalled. We can note that the other reference to the language of the text, which occurs in line 16 - *when you run races* - from the last sentence of the text could also be a recalled link into the mediated exchange reported in Section 10: *when we did sports practice*.

9.13 Summary of the effect of metaphors in the text on learning

- processing of the metaphors did seem lead the participants to recognise gaps or over-simple explanatory theories in existing knowledge
- one nominal (*no man-made pump*) and two verb (*relax / brought back*) metaphors seem to offer positive support for understanding, not through radical change, but through isolating and emphasising aspects of existing knowledge
- understanding of how the heart works was weakly restructured, in that specific details, such as the number of beats per minute, were acquired. The misunderstandings brought to the text about the heart as a pump resisted strong restructuring.
- understanding of how the brain controls the body through hormones in the blood was strongly restructured through negotiation with the researcher, employing multiple and reciprocated use of metaphor
- both explicit and underlying metaphor had a negative effect on learning when successful interpretation was constrained by lack of knowledge of Topic and Vehicle domains, combined with linguistic and cognitive complexity.
- the writer's choice of metaphor, both Topic and Vehicle, seemed to contribute to failure to assist learning in various ways - the Topic and / or Vehicle could be too complex, too abstract, unfamiliar; an inappropriate aspect of Topic might be linked in a metaphor; the text did not provide enough support to the understanding of the metaphor

9.14 Limitations of Investigation 2

9.14.1 Validity of GITA methodology

The interactive and goal-directed variant of Think Aloud methodology devised for this second study has produced useful data, including spontaneous mediation of metaphor. Two validity concerns were expressed in Chapter 7, Section 7.12: the distancing effect of Thinking Aloud about each sentence in turn, and the separation of the written text from the graphics that appear with it in the book, and we can now return to these and evaluate their impact.

Separating the written text into sentences may have lost some of the discourse cohesion between sentences that would have helped make sense, for example of anaphoric reference. Rather than presenting participants with individual sentences each time, they could have been presented with 2 or 3 sentences together that formed a cohesive group, as with the first two sentences of the Heart text. However, sentence by sentence processing did reveal where inadequate referencing led to difficulties for the readers; in

these cases, the separation of sentences could usually be ruled out as the prime cause of difficulty. I would thus argue that the loss of validity in this way was not a major issue.

The second validity concern, separating the written chunk of text from its graphic context in the book, is a major limitation of this type of study, for adults perhaps as well as for children. The coloured pictures and diagrams in the book provide information in ways that complement the written text, and as described in Section 7.12, are normally used as part of the whole reading / making sense process, with attention moving from the pictures and labels to the chunk of text and back again. Separating the chunk of text in the GITA methodology did therefore create a different task for participants, and the outcomes of that task - making sense of a solid chunk of text - may be limited in their generalisability to the task of making sense of pages of a book. In order to increase the validity of the Think Aloud, children would need to be observed as they looked at the pages to track where their attention was directed, and the Thinking Aloud carried out on all that they looked at and thought about. This would allow the conceptual appropriacy of the graphic content to be evaluated too.

Meanwhile, the task as carried out for this study remains valid for the processing of text without graphics, and there are some school situations in which children are asked to do this e.g. some of the national Standard Assessment Tasks in English or in some textbooks. In forcing the participants to deal with the written word alone, the GITA task also perhaps stretched their reading and language skills, and thus provides useful information about the demands of processing decontextualised text containing metaphor.

9.14.2 Generalisability

It is recognised that care must be taken in generalising from a small-scale case study. The findings about how Louise and Ellen processed the metaphors they encountered in the two texts will not necessarily transfer to other children working with different texts. This would need to be checked in further studies. However, the processes and strategies they have been found to use do suggest that the categories developed in Table 7.3 have some potential for describing metaphor processing more generally.

Analysis of the problems encountered by Louise and Ellen, on the other hand, does lend itself rather more to generalising. What went wrong for these participants could go wrong for any child working with any text. There may, of course, be other potential problems that this case study did not pick up, but those that were identified can be given

some importance in increasing our understanding of how metaphor in text may fail to support cognitive change.

9.15 Discussion of the full results of Investigation 2

Investigation 2 used goal-directed interactive Think Aloud tasks to provide data to investigate how children make sense of metaphor in text, and the role of the metaphor in learning. Close analysis of the data has revealed something of the interaction of existing Topic and Vehicle domain knowledge with the metaphorical language used in the text sentences.

Metaphor processing from a discourse perspective

It is clear from this study that successful metaphorical use of language derives from successful choice by the producer, together with successful application by the receiver of processing strategies and skills, and any negotiation of meaning that takes place between them or is mediated by others. A prosaic perspective on metaphor in use requires that the discourse context of interpretation includes the selection and use of metaphor by the writer of the text, in contrast with some of the research studies reported in Chapter 7 which evaluate the success of interpretation solely in terms of what the child does or does not do.

Some discussion of the outcomes of the GITA study has already taken place in the process of describing results, as is inevitable in a qualitative study. In this section, I use the research questions set up in Chapter 7 to structure further discussion.

1. Is there evidence that the children process linguistic metaphors in the text metaphorically?

A scheme categorising utterances in terms of aspects of metaphor processing (Table 7.3), which developed that used by Steen (1992), was applied to the sentence protocols. The occurrence of the 3 categories: Vehicle Development, Topic Development and Metaphor Construction, was taken as evidence that linguistic metaphors were processed metaphorically i.e. the linguistic metaphors processed using these 3 were also "process metaphors". An attempted metaphorical interpretation was no guarantee of a successful outcome, and unsuccessful processing will be discussed further below.

Processing strategies

The children used a range of metaphor processing strategies, and difficulties in interpretation usually arose from lack of knowledge, rather than from lack of skills. The

following "operating principles" appear to be employed in the process of interpreting metaphors in texts. The listing does not imply that these are employed sequentially; one or more may be employed in any instance of processing:

- Develop the Vehicle term first, use connotations, semantic features and synonyms to find a way in which to link Topic and Vehicle term. If this does not work, develop the Topic term, drawing on existing knowledge and information from elsewhere in the text.
- Use linguistic form as a **guide** to word-sense relations; work at this level unless forced to closer scrutiny by failure to reach an interpretation.
- Draw on personal experience or knowledge to contextualise the Vehicle and highlight certain features of it.
- Stay with existing conceptualisations of the Topic domain, using them to make sense of metaphors wherever possible, and ignoring some degree of misfit.
- Put the Topic and Vehicle term back together after Development to make sense of them as a unit.

Active Metaphor Processing as a Reading Strategy

The example of *muscular walls* showed the participants attempting active metaphor processing on an unfamiliar phrase, suggesting that it might have some role as a strategy for making sense of new information, even when metaphorical intention is not signalled or intended.

The effect of linguistic form on processing

Word Class level

Nominal and verb metaphors appear from this analysis to be processed differently; nominal metaphors are more likely to be noticed, and processed through more operations than verb metaphors. The source of this observed difference may lie in an essential difference between how nouns and verbs can be used metaphorically.

Phrase or clause level

While distinctions are clearly obvious at Word Class level, further differences in processing occurred as a result of the syntax of the metaphor Frame i.e. how the Topic

(if explicit) and Vehicle are linked in a phrase or clause. For example, *NP of NP* metaphors were highly noticeable and the GITA processing suggested that the form helped receivers access the meaning; e.g. the negative metaphor *no man-made pump is more reliable than your heart* generated more talk about Vehicle domain concepts than did the Noun Phrase metaphor Vehicle *this pumping*.

The processing demand of linguistic form was compounded by the cognitive demand of the lexical content, and when the combination presented too high a demand to the reader, it seemed that form took second place to content, acting as only a weak guide to finding the meaning of a sentence.

Metaphor and simile

In the protocols of all three *NP of NP* metaphors, Metaphor Restatement moves between including and omitting *like*. e.g. *the atmosphere is the blanket of gases* is restated in the form of a simile - *it's like a blanket*, suggesting that the two forms are, in these discourse contexts, equivalent for the participants. This is further evidence that the two surface linguistic forms reflect the same underlying processing. It is appropriate to label some similes as metaphorical, and to hold that a distinction between metaphors and similes made at the level of surface linguistic form ignores or cuts across a more fundamental distinction between metaphor and literal comparison.

2. How is previous knowledge of the Topic and Vehicle used in making sense of the metaphor?

Theory-processing links

In metaphor theory, the Topic and Vehicle domains of a metaphor are considered as separate, and metaphor seen as a "bridge" between the two semantic fields or conceptual domains (Kittay 1987:279). It is then possible to conceive of processing as moving between Topic and Vehicle, as in Black's interaction view of metaphor (Black 1979), or to suggest that "analogy" can be distinguished from "metaphor" because transfer is only one-way, from Vehicle to Topic (Gibbs 1994). However, the empirical study of processing has shown how difficult it is to separate the effect of Topic and Vehicle knowledge in the thinking of participants as they process text under GITA conditions. The discussion below will demonstrate the inter-relatedness of Topic and Vehicle in metaphorical use of language. If theory-level explanations are to be congruent with processing level evidence (Chapter 1, Section 1.4), then the overlapping of Topic and Vehicle may have implications for theory.

The second investigation highlighted two different levels of Topic / Vehicle knowledge that can affect making sense: knowledge about explicit Topics and Vehicles in the text, and knowledge in the form of underlying metaphorical schemata linked to the topic of the text.

Existing knowledge - the effect of underlying metaphorical schemata on processing

"Previous knowledge" is not a static set of information, activated on demand, but is as Rose (1993) reminds us, reconstructed each time it is used. It is thus dynamic, sensitive to discourse context (Barsalou 1987), and has some flexibility, so that it can be made to accommodate new information in a text without strong restructuring. This was evident in the processing of the second text, where existing schemata, with gaps and inaccurate explanatory theories linking blood and respiratory systems, came face-to-face with metaphors in the text that could not fit the schemata. There was adjustment on both sides - the meaning of the text and the knowledge schema were both adjusted slightly so that sense could be made without the need for radical change.

Knowledge about explicit Vehicle terms

• **Vehicle knowledge can signal metaphor**

Highly incongruous Vehicles, i.e. terms that contrast strongly with the lexical co-text of terms from the Topic domain, serve to signal metaphorical use of language, and probably to enhance the probability of successful processing.

• **Vehicle terms are most helpful when basic, familiar, concrete and specific**

Basic level, familiar and concrete Vehicle terms were processed without difficulty. Some metaphors could not even begin to be understood because the Vehicle term was unknown e.g. *chambers*. In the second text, the abstract, general and complex nature of the Vehicle *transport system* contributed to problems in making sense of it used metaphorically. In processing, it was reduced by receivers to a more basic level, concrete and familiar concept *traffic lorries*. The reduction of cognitive demand was not independent of the Topic, however; the revised Vehicle was chosen because it made sense of receivers' existing Topic knowledge.

• **Vehicle knowledge focuses Topic interpretation**

The lexical choice of Vehicle by a writer is extremely important when metaphor is used ideationally; it should ideally focus attention on the relevant aspects of the Topic, and at the same time prevent attention being directed to irrelevant aspects. In Investigation 2, the Vehicle chosen was sometimes ineffective in doing this: *blanket / shield* focused

attention on the protective function of the atmosphere at only a very general level, and could not work to complexify the children's understanding of what features of the atmosphere were responsible for this function or what we need protecting from. *walls* in the heart text activated ideas of rigidity, leading to the proposed Topic *ribs*, rather than activating the relevant idea of keeping two chambers separate. Again though, the choice of Vehicle cannot be independent of Topic in the writer's mind; when choosing a Vehicle, the writer must first be quite clear as to which aspects of the Topic, and to what degree of complexity, s/he wants to focus attention on.

- **Vehicle terms must be amenable to Contextualisation and Development**

Since Vehicle Contextualisation and Vehicle Development have been shown to be central processes in making sense of metaphor, the Vehicle chosen by a writer needs to have this potential. This requires that the writer take into account intended readers, and accurately estimate the nature and extent of their knowledge of the Vehicle domain, and the probability of the reader's capacity for relexicalisation, exemplification and explication of the Vehicle. In the absence of skilled mediation, this is even more crucial, if solitary readers are to understand and learn from the text.

Topic knowledge

- **Topic knowledge can focus Vehicle knowledge**

Even if the Vehicle domain is familiar to the receiver, and well-developed, making sense of the metaphor may still not be straightforward, and Topic knowledge is required to isolate the appropriate aspects of Vehicle knowledge to apply to the Topic.

- **Topic knowledge can prevent understanding**

Gaps in Topic knowledge will have an adverse effect on processing, as when the child readers did not know that the blood carried food or oxygen, and so could not make sense of the metaphor of the blood as transport system.

- **Topic knowledge can prevent misunderstanding**

Topic knowledge also acts as some kind of safeguard against inappropriate interpretations, as when Topic knowledge ("*your ribs are not a wall*") prevented an inaccurate interpretation being accepted in the protocol of *muscular walls*.

3. How do encounters with metaphor contribute to learning, positively or negatively?

In discussing "encounters with metaphor", linguistic metaphors cannot be separated from their discourse context, including co-text, goals of and participants in the task, background knowledge, skills and resources brought to the task. It has been clearly shown that a combination of factors contribute to learning as an outcome of processing texts with metaphors.

In both tasks, the actual impact on participants' understanding of processing the text was mostly limited to weak restructuring:

- accumulation of some details about aspects of existing knowledge e.g. numerical information
- isolation and emphasis of certain aspects of existing knowledge

The strong restructuring i.e. significant cognitive change, identified in the second GITA resulted directly from mediation of the text by the adult.

Previous knowledge that is structured through metaphor (*heart as pump*) is constrained by limited experience and understanding of both the Topic and the Vehicle domains. It has been seen to be resistant to change, with new information being made to fit the existing theory rather than changes being made to the theory. This is probably a useful strategy for learners to adopt, avoiding continuous fluctuations in concepts and theories. When restructuring does occur, it will then be quite significant, increasing the probability of conscious awareness (as with the hormones in the blood) and thus of consolidated and effective change.

In both areas covered by the texts, the type of cognitive change needed by the participants was relational, to do with how aspects of the Topic domain are constructed and produce the effects they do. In each case, the selection of Vehicle did not support this type of cognitive change.

Topic Reference Shift

Recurrent evidence of this potentially important phenomenon was found in the GITA protocols, predominantly in the processing of verb metaphors, but also for some of the nominal metaphors. No evidence was found of such a shift in the processing of verbs used non-metaphorically.

What seems to happen is that the Subject or Object of a verb used metaphorically can shift in participants' talk as the sentence or clause is processed, and there is some evidence that this shift can be more than temporary, in that recall shows a similar shift from the writer's original form. Recall evidence would also support an inference that the shift is not just a surface language feature, but may also affect thought.

Sometimes the shift does not change the meaning e.g. with an ergative verb like *pump*. Sometimes the change in meaning is metonymic and not very important e.g. *the atmosphere* → *the ozone layer*.

Sometimes, however, the shift in meaning is important because it produces an inaccurate meaning e.g. air pushes the blood around rather than the heart. It may be important in terms of cognitive change because it allows previous, inaccurate, understandings to be maintained, or because a collection of Topic Reference Shifts across processing of a whole text leads to accumulated misunderstandings. Conversely, one motivation for Topic Reference Shift may be precisely this reluctance to make major changes in conceptualisations.

4. How does metaphorical language assist recall of information?

There is some evidence that striking Vehicle terms may be recalled verbatim, and thus have the potential to work as episodic memory. However, it was also shown that the information attached to these Vehicle terms might be recalled inaccurately.

Non-metaphorical language which incorporated numerical data appeared to be available in short and long-term recall, particularly for one of the girls, suggesting that different people may find different types of information easier to recall.

5. What is the role of mediation and multiple use of metaphor, where offered, in reaching shared understanding? are there factors that appear to influence success in mediation?

In Investigation 1, classroom discourse was shown to provide support for the understanding of both deliberate and emergent metaphor. This discourse support for comprehension operated through the discourse surrounding metaphor, which typically includes signalling of metaphor, explication and relexicalisation of the Vehicle term, and focusing of the key aspects of Topic and Vehicle that need to be linked. The linguistic metaphors used in the written texts of Investigation 2 were shown to be largely devoid of such discourse support for comprehension, and it is claimed that the lack of such support was a contributing factor to problems in processing. The children's Thinking Aloud

compensated by providing some mutual support, and the spontaneous mediation by the researcher of certain concepts has been shown to include again these types of discourse support.

Metaphor may offer a "bridge" to understanding something new about the Topic domain through existing knowledge of the Vehicle domain (Kittay 1987). As I have discussed in the sections above, a producer of metaphor may construct an inappropriate bridge that, even with full understanding and skilled interpretation, cannot increase Topic knowledge - the bridge is just built in the wrong place, as it were, and no amount of mediation can make a difference. In other instances, the bridge offered by metaphor is appropriate, but is temporarily inaccessible. In this case, metaphor may fail in its bridging role for a range of reasons, often found in combination, and mediation can turn failure to success.

The reasons for failure may be summarised as:

- Topic knowledge assumed by the producer is not known by the receiver
- Vehicle knowledge assumed by the producer is not known by the receiver
- links between Topic and Vehicle that the producer assumes will be obvious are not available to the receiver

Mediation then acts by building other smaller, interim bridges that eventually lead to the original bridge, having en route made it accessible. This is done by

- assessing gaps in knowledge
- filling gaps in knowledge, often through other related metaphors
- making links explicit
- negotiating understanding of the knowledge and of links - checking, clarifying and summarising - often through converging metaphors

The skills involved in mediating metaphor include sensitive fine-tuning to children and breaking down the task of understanding into smaller sub-tasks. In the process of mediation, multiple metaphors seem likely to be used. The study has suggested that multiple use of metaphors by the producer, rather than a mediator, can be helpful if

- different metaphors involve relexicalisation of the Vehicle for the same Topic
- different metaphors highlight particular key aspects of the Topic
- different metaphors work at different levels of generality or abstraction

However, the effective use of multiple metaphors in a text will still be constrained by the same accessibility factors as use of single metaphor.

Mediation of the meaning of metaphors may also be effected non-verbally and non-metaphorically, e.g. by the use of graphics, models and practical demonstration.

9.16 Implications for writers of text books

The implications of the results of Investigation 2 for writers who use metaphor and wish to minimise the risk of misunderstanding are summarised as a set of checking questions.

- Have you explicitly decided, in the light of your readers' probable understanding of the topic, which particular ideas and explanatory information you want to get across through the use of metaphor?
- Have you included text or graphics to ensure that the previous knowledge of the Topic you are assuming is established, summarised and activated?
- Have you selected Vehicle terms that will enable readers to focus on the key aspects of the Topics?
- Have you selected Vehicles for these metaphors that will be familiar to your readers, that are not too abstract, general or complex?
- Have you chosen Vehicles that your readers will be able to contextualise to aspects of their everyday lives or experience?
- Have you chosen Vehicles that your readers will be able to develop - to find other ways of saying them, give examples of them, elaborate them?
- Have you developed the Vehicle terms in the text? - are they pre- or post-modified by Vehicle-related terms? do you give examples of the Vehicle? do you use both metaphorical and non-metaphorical language?
- Do you use multiple metaphors for important or complex ideas?
- Do the graphics accompanying the text illustrate the Topic-Vehicle links clearly?
- Have you taken precautions against Topic Reference Shift in processing? e.g. through careful use of anaphor and, in particular, of pronominal reference.
- Have you chosen a linguistic form for your metaphors that maximises the probability of successful processing by setting out the T-V relation as explicitly and simply as possible? e.g. {*NP is NP of NP*}.
- Have you glossed or illustrated words likely to be unknown, to avoid inappropriate metaphorical processing?

CHAPTER 10

METAPHORICAL USE OF LANGUAGE IN EDUCATIONAL DISCOURSE: CONCLUSIONS AND IMPLICATIONS

10.1 Outcomes of the study and contribution to the field

The study has explored aspects of metaphorical use of language in educational discourse. In particular, it has developed a theoretical framework to identify and describe metaphor in use in discourse involving children. Empirically, the study has investigated how metaphor is used in classroom interaction, and how children make sense of metaphors encountered in written texts. The empirical investigations have also served to validate and refine the theoretical framework.

The contribution of this thesis to the field of metaphor studies has been generated by the particular applied linguistic perspective taken. The need to take a prosaic approach to analysing metaphor has generated a theoretically-adequate, descriptive framework, and a range of useful analytic procedures, for working with metaphor in discourse. The use of framework and procedures has produced in-depth information about how prosaic metaphor is used ideationally, interpersonally, and interactionally in discourse, which suggests clearly that prosaic metaphor is in many ways distinct from what has often been assumed in a 'metaphor as figurative device' approach. The nature of metaphor in use revealed by the study suggests various areas for further research. In addition, a set of practical implications has been found that may be of importance to teachers, text book writers and others working in education or training.

In the final sections of the thesis, I address each of these in turn.

10.2 Describing and analysing prosaic metaphor

The approach taken to metaphor was described in Chapter 1 as a prosaic approach, which, as a fundamental requirement, must take account of metaphor in language use as interactional, holistic and context-based. Theory-level analyses and representations were further required to be consistent with conceptual-processing level analyses and representations. Various implications for a theory of prosaic metaphor followed from these basic requirements.

Firstly, there is no guarantee that the types of metaphors traditionally described in the literature will be found in discourse, or that, if they are found, they will have been generated through some sort of active metaphor processing. A crucial distinction was

made between "linguistic metaphors", which are identified theoretically, and "process metaphors", which can be shown to have been processed metaphorically. The development of identification procedures for linguistic metaphors then proceeded from the literature on metaphor as device by isolating necessary conditions of incongruity between domains and the possibility of transfer of meaning across those domains.

Secondly, sufficient conditions for metaphoricity were ruled out by the flexibility of language in use in interaction, and were replaced with typical and graded conditions. Typical conditions were extracted from the literature, and could be used as fixed points against which to compare candidate linguistic metaphors. A range of graded conditions was extracted from the literature, and amended after use in the empirical investigation of classroom discourse.

Thirdly, the continuity of metaphor in use with other uses of language, such as allusion, hyperbole and extension, meant that boundary conditions had often to be imposed by the researcher on the category "linguistic metaphor". The study has demonstrated clearly that many such boundary decisions are not straightforward or obvious, and that, for replicability, researchers into metaphor need to be explicit about boundaries they impose.

The combination of necessary, typical and graded conditions with explicit boundary conditions was successfully used to identify and describe prosaic linguistic metaphor in use, producing a largely coherent category. A further dimension of description was provided by analysis of the linguistic form of metaphor. Nominal and verb metaphors have been shown consistently to differ in how they are noticed and how they are understood in discourse. Evidence to date suggests that this difference is not sufficient to warrant splitting the category of prosaic metaphor, but this requires further investigation.

Fourthly, analysis of metaphor in interaction required the development of new units and methods of analysis. In particular, the Metaphor Framing Episode was developed as an interactional unit of analysis at a level beyond the linguistic metaphor. In analysing classroom discourse, it was shown that a "cross-level analysis", which maps MFEs on to goal-oriented analysis of sequences of discourse, can reveal how metaphor is used to achieve ideational and interpersonal discourse goals. Analysis of the interplay of metaphorical and non-metaphorical language within MFEs has revealed significant patterns of interaction around metaphor.

Fifthly, recent work in cognitive psychology on concepts as based on explanatory theories was found particularly useful in describing domain knowledge that may be activated when metaphors are processed. The notion of cognitive change as weak or strong restructuring of explanatory theories was useful in the exploration of the possible role of metaphor in instigating learning.

10.3 Poetic and prosaic metaphor

10.3.1 The Continuity Issue

My initial, fairly rough, distinction between "prosaic" metaphor, that used in everyday talk, and "poetic" metaphor, that constructed for poetic or emphatic use, was refined into a more subtle distinction between deliberate and emergent metaphor. Emergent metaphor is seen, in a complex systems analogy, as a use of language that result from the employment of language and cognitive resources to achieve discourse and interactional goals. It is an "edge of language" phenomenon, not essentially different from other extreme uses of language, that may produce metaphor in a single interaction, or over the course of many interactions between different participants within a speech community. Very ordinary metaphorical uses of delexical verbs and prepositions can, in this way, be seen as creative as very unusual nominal metaphors. Deliberate metaphor, on the other hand, is created through employment of language resources deliberately for effect, poetic or otherwise. Deliberate and emergent metaphor differ essentially at processing level. The question of whether there is continuity between emergent and deliberate metaphor remains unanswered. My hypothesis is that there may be a discontinuity relating to skill in the use of language, and to aspects of discourse processing, such as time, contextual demands and capacity; sensitive experimental studies of processing would be required to establish this.

10.3.2 Managing the risk of metaphor

It was hypothesised at the beginning of the study, as metaphor as device was drawn on to develop a theory of prosaic metaphor in use, that the use of metaphor in interaction would present a communicative risk. This hypothesis has been proved faulty.

The hypothesis of metaphor as a communicative risk can be seen as a theory-level hypothesis which is incompatible with processing-level evidence. Users of metaphor do not appear to take or to suffer undue risks. A language in use approach should, with hindsight, have predicted this. Given goals of mutual understanding, we should premise that metaphor use will lead, not to risk but to efficient risk management. Close and careful analysis of metaphor in classroom interaction has shown that discourse

participants choose and use metaphor with great sensitivity to interlocutors. In particular, the study has demonstrated that metaphor in interaction is usually accompanied by a range of features that serve to signal the use of metaphor, and to indicate appropriate interpretations. Metaphor Framing Episodes have been shown to contain important information that supports the understanding of metaphor through mechanisms of Vehicle development, repetition and relexicalisation. Furthermore, when metaphors in written texts are not provided with this type of support to understanding, children talking about the metaphor will provide it for each other, and where such information cannot be found from previous knowledge, serious problems in understanding can arise.

Pedagogically, evidence of risk in metaphor use has been found. Teachers were found to make frequent use of metaphors that downplayed the cognitive complexity of the topic in hand. Sometimes, this had valid interpersonal aims such as mitigating the threat of difficult ideas. Often, though, it took the form of using more ordinary or 'homely' language to talk about ideas, such as mathematical concepts or literacy processes and skills, at levels that may be too simple or too general to help a child develop concepts. Over time, and with repeated systematic use of such metaphors, there may be a risk of the sympathetic teacher inadvertently blunting the sharpness that is needed at the edge of learning.

Accurate understanding of metaphors in written texts was put at risk by a number of factors, including gaps in a child's knowledge of Topic or Vehicle domain and a writer's unhelpful selection of metaphor Vehicle.

10.4 Implications for teachers and text book writers

The study has shown how the preferred metaphors of individual teachers reflect their values and attitudes to classroom activities and practices, and may influence pupils on a daily basis. The results of the first empirical investigation can be used to help teachers become aware of how this happens. They would then be equipped to evaluate their own practice and decide whether to initiate change.

The identification of interactional mechanisms for providing appropriate ideational support for metaphor understanding is important for teachers, text book writers, and anyone else who is concerned with constructing shared understanding of ideas with others: e.g. psychotherapists, counsellors, trainers, and museum staff who act as "explainers".

Analysis of successful mediation, in contrast with children's failure to make sense of unmediated metaphors, in the second empirical investigation has shown how a focus is required on the key features of the Vehicle, usually relational, that are to be transferred to the Topic, and how this focus can be made clearer by using more than one metaphor at the same level of generality, by employing metaphors that work at a more specific level, and by negotiating the acceptability of alternative metaphors between participants. Combined with mechanisms found in classroom MFEs, of Vehicle development, repetition and relexicalisation, users of metaphor can be equipped with a powerful range of ways to develop shared understanding in the process of jointly constructed discourse.

5. Further research into prosaic metaphor

This study has merely scratched the surface of metaphor in use, and in doing so has already raised several issues for further research:

- A prosaic approach to a theory for simile is required - the data on simile use has shown the inadequacy of various existing theories and generated information that a new theory must take account of.
- More work is needed on the comparative processing of deliberate and emergent metaphor, both in production and in understanding.
- The GITA (goal-directed interactive think aloud) methodology developed in the second investigation requires further work to validate it, and to try it with younger children; at this point, it seems to be a potentially important new way to elicit processing data from children, and I would predict that it could be used with children as young as five or six years of age.
- Further work with spoken discourse data may reveal how far adult-adult talk of different types also includes features that signal the use of metaphor and support its understanding. The inclusion of discourse context characteristics as parameters of a language in use approach mean that analysis can be sensitive to participants and goals of different types of discourse. In other words, the theoretical framework developed for metaphor in use is likely to be predictive as well as explanatory.

In conclusion, the research into metaphor use in discourse context carried out for this study has shown that a genuine area for investigation exists, and is needed in the field of metaphor studies to complement experimental, laboratory-based studies in the psycholinguistic tradition. The work for this thesis has revealed to me unexpected differences between traditional literary metaphor and prosaic metaphor in discourse. It has uncovered something of the complexity of children's experience with metaphor, and yet there remains much of importance to be done. Metaphor, revealed in its ordinariness, still retains its power, mystery and excitement.

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APPENDIX 1

SAMPLE OF TRANSCRIBED CLASSROOM DISCOURSE

SYMBOLS USED IN TRANSCRIPTION OF DATA

(.)	micro pause
(1.0) etc	pause of approximately 1 second
?????	indecipherable stretch of talk
?	rising / questioning intonation

Speakers

Pupils:

L:	Louise (focal subject of research)
E:	Ellen, Louise's friend
M:	Marie
H:	Heather
D:	Dougal
P:	pupil, name not known

Teachers:

T1	Head teacher and main class teacher of the Year 5 / 6 class
T2	Part-time teacher of Year 5/6 class
T3	Teacher of the Year 3/4 class

SAMPLE OF TRANSCRIBED CLASSROOM DISCOURSE

GEOLOGY LESSON

TAPE 5: 186 - 268

Note: T is the teacher T1. Other abbreviations and symbols are as listed on page

L: reads worksheets ...hums

T. sorts out who needs which copies of worksheets

186 T: we're starting with the one with lots of writing on (2.0) the geology of Cumbria (1.0)
and (.) on the top line (.) we need to put in (.) next to the title (1.0) very neatly
(.) the short date (1.0) and your name

writing

190 okay ? (.) now on the next sheet (.) can we have that rubbed out? and can we have
it written (.) on the line (3.0) on the next sheet (1.0) which is the one (2.0) um (3.0)
why are all of the rock types present (.) you also need to put your name at the top (.)
and the date (.) and the same on the other sheet (.) so you've done (.) all the (.)
naming (.) ...

195 now what I'm going to do (.) this afternoon (1.0) because I can't think of any other
way to do it (1.0) is to give you (.) a little bit of information (2.0) on which (.)
we can (.) build (.) our understanding (1.0) of (.) rocks (4.0) and (.) the
minerals that come out of rocks (1.0) and also(.) how rocks (.) weather (2.0) in
other words (.) what happens to rocks (1.0) when (.) the snow (.) and the wind
200 and the ice and the rain and the temperature (1.0) acts upon them (.) so there are (.)
really two things we're going to look at (2.0) this half term (.) one is (.) how rocks
weather (.) and the other is (.) about the minerals (.) that are in them (.) that
we can use

P: ????

205 T: don't worry about it for now (.) um if (.) if when we've finished (.) you can just (.)
copy up (.) it won't take long cos it's very short (1.0)

so (.) looking at the first sheet first (2.0) if I let you read (.) that one right? (.)
there is a great variety (.) of rocks to be found (.) on the earth (2.0) now (.)
would you like to read on from there (.) Ellen (4.0) from (.) a simple

210 E: a simple three fold (.) classification (.) helps classifies (.) rocks according to the
way they were formed

T: so you know about (.) classification (.) don't you ? (.) what's (.) what's
classification a big word for? (3.0) I mean (.) is it to do with classes? (1.0) I
suppose it is in a sort of way (.) but what's it a big word for?

215 P: does it mean grading?

T: it can mean grading (.) that's that's a good (.) a good reason (1.0) it's also (.)
really basically (.) sorting (.) for example (.) if I give you a dish (.) that's
full of coloured marbles and plain marbles (.) and asked you to classify them (1.0)
one way in which you might classify them (.) is according (.) to plain (.) and

220 coloured (.) and you'd (.) split them up (.) wouldn't you? (.) but you could
also classify them according to (.) the colour and the size (1.0) so some of the
coloured marbles might be (1.0) big (.) and some might be small (2.0) so
classification (.) is really a way (.) of grouping things together (.) because they
have (1.0) characteristics (.) that are similar (2.0) let's just go into that a little bit
225 more (3.0) let's have (.) Gareth standing here (3.0) and let's have Mark (3.0) and
(.) we'll have (.) Cheryl here (.) and we'll have Hannah there (.) right? (3.0)
now we've got four people (.) and we're going to classify them (.) according to
(.) similarities (2.0) now there's a very easy way (1.0) you can put them together
(.) two and two (2.0) because ?(2.0)

230 P: they're humans (.) they're all humans

T: well (.) you could actually put (.) so all of you come together (2.0) you can all be
(.) in this great big group (1.0) which is called humans (1.0) now that's one
classification (1.0) as opposed (.) to (1.0) other animals (1.0) right? (.) so

- that's one classification (.) it's a very big one (1.0) but there's another one we could
- 235 do?
- P: female and male
- T: right (.) so then you regroup (.) so off you go (2.0) then we've got another classification (1.0) they're still human (.) so we can put them in a big circle that says human (.) but we can also put them into two smaller circles (.) that says (1.0) male (.)
- 240 female (1.0) is there another way we could classify them? (3.0) Ellen?
- E: height
- T: height (.) could we put any of them together on height?
- P: yes
- T: how (.) what could we do?
- 245 P: boys and girls
- T: how (.) how would you do them for height? (2.0) Kevin?
- K: put Hannah and Mark
- T: put Hannah and Mark together
- P: but you got boy and girl
- 250 T: doesn't matter (.) go on (.) go on (.) so we could reclassify (.) according to height (2.0) now what's beginning to happen now (.) is (1.0) that you see (.) that you can be part of (.) one classification group (1.0) and then lo and behold you can be part (.) of another (.) and it all depends (1.0) how you're classifying doesn't it? (.) it all depends (.) which (.) particular rule you're using (.) at which particular
- 255 time (2.0) there's another way in which we could do them (1.0) just these four (3.0) and in actual fact they'd all come together
- P: eye colour
- T: eye colour (2.0) and they've all got blue eyes (1.0) so you all come together again (2.0) what about (.) hair colour?
- 260 L: mm (2.0) Mark (.) and (.) um Gareth (.) have got darker than Hannah and

- T: they're darker (.) aren't they ? (.) so we could separate them again (3.0) what about hair length?
- L: Cheryl and Mark
- T: we could put Hannah with the boys (.) perhaps (.) cos hers is short (.) ish (2.0)
- 265 or not (.) what do you think?
- P: could put her with the boys
- T: or we could be fussy (.) and put Gareth on his own (.) because he's got a particular hair style (2.0) *laugh from Ps* and Mark

APPENDIX 2

MAPPING OF TEACHING SEQUENCES AND METAPHOR FRAMING EPISODES

MAPPING OF TEACHING SEQUENCES AND METAPHOR FRAMING EPISODES: GEOLOGY LESSON

lines	Teaching Sequence	Activity / language	Metaphor-Related Episode and Linguistic Metaphors
165-194	Framing (of lesson) 2.1 Organisation	Putting names and dates on worksheets	
195-206	2.2 Planning	"now what I'm going to do this afternoon..."	1. <i>give you a bit of information build our understanding minerals that come out of rocks ... temperature acts upon them things we're going to look at</i>
207	Instructional	Child reads aloud from worksheet.	2. <i>what's classification a big word for? what's it a big word for?</i>
210 - 225	1.1 explanation 1.2 exemplification 1.5 recap	Teacher explains "classification" Classifying marbles by colour / size "so classification is really a way of .."	3. <i>let's just go into that a bit more so we can put them in a big circle that says human ... two smaller circles that says male and female</i>
224-225	Framing 2.2 Planning	Introduction of next example.	
225-236	1.2 exemplification	Classifying children by sex.	
237-240	1.5 recap	Summary of example of classification by sex.	
241-268 (end of side 1)	1.2 exemplification	Classifying children by height	
269	Framing	Back to the worksheet	
270-275	2.2 Planning Instructional 1.1 explanation	Geologists' classifications of rocks. Igneous rocks An extra worksheet is photocopied	4. <i>they (geologists) look at rocks with three things in mind ... are formed by fire</i>
275-281	Framing 2.1 organisational		

282-289	Framing 2.2 planning	Children write "fire formed" before moving on to how this happens	5. we'll come back in a moment to how
290 - 295	Instructional - read and write 1.1 explanation	Teacher writes "sedimentary" on board to be copied	6. rocks which are laid down water formed
295 - 302	1.2 exemplification	Limestone as example of sedimentary rocks, with crinoid fossils in.	<i>limestone is laid down crinoids .. like mini animals like animal plants wave their arms; feet.. catch food.. bring it in</i>
303 - 309 310 - 327	1.1 explanation 1.3 modelling (demonstration)	of metamorphic rocks Teacher crushes polystyrene cup to show change under pressure.	7. you build up heat
327 - 341	1.5 recap	Metamorphosis under pressure	<i>take a tiny hair thin slice</i>
341-342	Framing 2.2 Planning	Teacher tells children that she will try to get a sample of marble to look at	8. I hope Mr C will come up trumps
343 - 351	Instructional 1.1 explanation	Limestone in Cumbria, marble in Greece	
351-352	Framing 2.2 Planning	Having written down the 3 types, they return to the first (igneous) to consider how they are formed	9. let's go back to these rocks

352- 384	Instructional 1.1 explanation	How volcanoes form igneous rocks	<i>fire formed igneous rock comes to be formed volcano...starts working (x 2) rock...like sticky treacle ...like runny butter is molten lava like wax? (x2)</i>
384 - 419	1.1 explanation	How all 3 types are found in Cumbria	10. <i>granites...laid down</i>
420 - 426	1.2 exemplification	Slate as sedimentary rock and its uses	<i>river...bringing down a slate roof was considered really quite something</i>
427	Framing 2.2 Planning	Return to read the worksheet.	11. <i>the next little bit says</i>
427 - 434	Instructional	How all 3 types are found in Cumbria	
434 - 445	1.1 explanation	shap pink	
	1.2 exemplification	limestone	
(435 - 437)	(6. Other: interruption)		
446 - 449	Framing 2.2 Planning	States intention to match types of rocks to map of Cumbria	
450 - 455	1.4 checking understanding	"The limestone...you already know...?"	
456 -464	Framing: 2.1 Organisational	Completing worksheet	
464 - 469	Instructional 1.5 recap	Overview of lesson content: "you've got very complicated geology in Cumbria"	12. <i>geologists...keep coming up with new ideas</i>
469 - 475	Framing (of lesson) 2.2 Planning	How the next day's work will link to this.	13. <i>we'll have a look at why... how the local rocks...fit into the overall picture of the age of the earth</i>
476	2.1 Organisation	Putting worksheets away.	

APPENDIX 3

GRAMMATICAL FORMS OF VEHICLE TERMS IN EACH DISCOURSE EVENT

GRAMMATICAL FORMS OF VEHICLE TERMS IN EACH DISCOURSE EVENT

Combined scores across both Single Word and Multi Word metaphors, omitting Clause level and Within Phrase metaphors, give the following (raw) frequencies of different grammatical forms:

	Verb	Noun	Preposition	Adjective	Adverb
1. Class Work	48	20	6	9	1
2. Geology Lesson	30	9	0	3	0
3.1 Maths (T1)	19	8	3	4	0
3.2 Maths (T2)	38	18	11	3	0
4. Apostrophe Lesson	47	1	1	4	0
5. Assembly	20	16	1	5	0
6. Dance	17	11	5	2	0
7. TV	14	2	1	1	0
TOTAL (n=378)	233	85	28	31	1

APPENDIX 4

TEXTS USED FOR THE GOAL-DIRECTED THINK ALOUD TASKS

1. THE OZONE LAYER

2. THE HEART

Introduction

1
2 It may seem strange that the liquid used to
3 cool the air in a fridge could be harmful to
4 life on Earth. However, when old fridges are
5 destroyed, harmful gases can escape into
6 the atmosphere. The atmosphere is the
blanket of gases that surround the Earth. It is
made up of several layers. One of these
layers contains ozone, a gas which protects
us from the Sun's harmful ultraviolet light.

Dangers and benefits

7
8 The Sun and the atmosphere make life on
9 Earth possible. The Earth is kept warm by the
Sun's heat, and the atmosphere traps some
of this heat so that it doesn't escape into
10 space. But not all the energy made by the
11 Sun is safe. Dangerous forms of radiation
called ultraviolet, or UV, light are also given
out, and these can be harmful to life.

12 The Sun is just the
right distance away
from Earth
to warm us.

Animals cannot use
the energy from the
Sun directly, and so
have to depend on
plants for food.

Protecting Earth

13
14 The atmosphere is like an invisible shield of
15 air surrounding the Earth. It contains different
16 gases which protect life on the planet. The
atmosphere lets useful energy through, but
reduces the amount of harmful energy
17 reaching the Earth's surface. At a height of
10 to 30km above us, there is a layer in the
atmosphere containing ozone. This stops
18 some of the harmful UV light getting to Earth.

from Bright, M. 1991. *The Ozone Layer*. London : Gloucester Press.

TEXT 2: THE HEART

THE HEART

1 Blood is the body's transport system (*as*
2 *explained on page 16.*) At the centre of this
3 system is your heart. It has four chambers
4 with muscular walls. About once a second,
the walls contract and squeeze blood out of
the chambers into strong tubes, called
5 arteries. The blood is pushed around your
6 body. As the heart relaxes again, its
chambers fill with more blood brought
7 back to it by other tubes, the veins. This
pumping, which we call a heart beat,
happens every second of every day, for as
8 long as you live. You can feel blood surging
9 through the artery in your wrist. Each surge
10 or "pulse" is one heart beat. So your "pulse
rate" tells you how fast your heart is beating.

11 No man-made pump is as reliable as your
12 heart. It can beat for 100 years or more
13 without a rest. Also, the heart is adjustable.
14 It can beat faster or slower, and change
how much blood it pumps with each beat,
15 depending on how active you are. The adjustments are controlled by
nerves from
16 your brain and by hormones. When you
are resting your heart might beat 60 to 70
times a minute, and pump about 70
millilitres (one-eighth of a pint) of blood
17 each time. When you run a race it beats
over twice as fast and pumps three times as much blood with each
beat.

from Parker, S. 1987. *The Body and how it Works*. London: Dorling Kindersley.

APPENDIX 5

SAMPLE GOAL-DIRECTED THINK ALOUD (G.I.T.A.) PROTOCOL.
THE HEART: SENTENCE 6

160 L: it's just the way it's described there (2.0) cos it's (.) it's told you more (.) but if
you've read the (.) other bits then it's (.) really good (.) at explaining it

R: do you think you know what that word contract means now?

L: it's (.) now you've read more of it it (.) describes it more

R: so does the rest of it make more sense?

165 E: yea

L: yea

E: it helps as you get on (.) more of it makes sense (.) or less does (*laugh*)

L: that's why you have the rest of the book and not just one page

R: (*laugh*) this is true yes (.) it's also why you have pictures all around it which you
haven't too

APPENDIX 6

COLUMN ANALYSIS OF PRE-G.I.T.A. DISCUSSION: THE OZONE LAYER

COLUMN ANALYSIS OF PRE-G.I.T.A. DISCUSSION:
THE OZONE LAYER

The column analysis was carried out on the transcription of the pre-GITA discussion between participants and researcher before working on the text. Utterances, omitting most non-fluency features and irrelevant content, were placed in columns, that show the sequence of turns from left to right and through the numbering.

Researcher's query	Louise's response	Ellen's response
(1) what do you know about the ozone layer ? have you heard about it?	(2) I've heard about it cos I sometimes watch the news	(3) heard about it a lot on the news and green programmes but we haven't learnt
(8) so what have you picked up from listening to all those? where is it? what is it?	(4) BBC1..Newsround (6) might be some books	(5) Blue Peter (7) Blue Peter
(12) it's a protective thing..you said something about a hole	(9) it's a big hole (11) something to do with the.. hard to describe	(10) it's a big protective thing protecting the earth from the sun (13) it's got a hole in it
(14) how did it get this hole in it? (16) uh ha	(15) is it from the sun's rays?	(17) greenhouse effect and everything
(18) what's that mean?	(19) has it got anything to do with pollution?	(20) air pollution and this from all the cars and everything and that
(21) right yes (23) sort of made what? (25) right		(22) sort of made (24) made the hole in it? (26) helped it
(27) and what's the greenhouse to do with it?		(28) don't know much about the greenhouse effect..

<p>(29) what do greenhouses do?</p> <p>(32) and it doesn't let it out.. so how might that be like the ozone layer? what's the connection?</p> <p>(36) oh right</p> <p>(39) .. what about this hole? does it matter, this hole?</p> <p>(42) why's it been on the news and everything?</p> <p>....</p> <p>(44) when you try and explain it</p>	<p>(30) it keeps a lot of heat in</p> <p>(33) the earth</p> <p>(35) and then it's trapping all the heat's earth (.) heat in</p> <p>(37) that's impossible</p> <p>(41) mm</p> <p>(46) not really realising what it's about</p>	<p>(31) heat in</p> <p>(34) the earth.. is getting it gets really hot</p> <p>(38) I don't know</p> <p>(40) yea</p> <p>(43) because it's the thing that protects the earth and if it gets a lot bigger it'll get much hotter from the sun's.. something so it stops the sun</p> <p>(45) it's when it gets all mixed up</p> <p>(47) I'm not very familiar with the ozone layer I don't know much about it</p>
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(Tape 8: lines 6 - 73)

APPENDIX 7

COLUMN ANALYSIS OF PRE-G.I.T.A. DISCUSSION: THE HEART

COLUMN ANALYSIS OF PRE-G.I.T.A. DISCUSSION:
THE HEART

This discussion involved five pupils and the researcher. As in Appendix 6, utterances relevant to pupils' knowledge, in this case about pumps and the heart, are placed in columns and numerically ordered as produced.

Researcher	Ellen	Dougal	Heather	Louise	Marie
(1) tell me one sort of pump	(2) a bicycle pump	(3) a car pump	(4) a pump shoe		(5) a petrol pump
(6) which bit's the petrol pump?		(7) I think the pump's only			
...	(8) where you pump all the petrol in	(9) petrol into the car			(10) it's the handle part where you pull the handle
(11) what am I missing here? I don't understand				(12) it's a sort of great gust of air	
...			(14) bicycle pump car pump petrol pump shoe pump		
(13) so we've got bicycles					
(15) any others		(16) pump - tuation			
(17) have you got any pumps in your house?		(18) water pump			
(19) have you?		(20) no			
(21) have you seen a water pump?					(22) there's one near us
(23) how do they work?					(24) you push the handle up and down

<p>...</p> <p>(25) have any of you got central heating pumps?</p>				<p>(26) I've got central heating but I haven't got a pump</p>	
		<p>(27) pump n' spray hair spray</p>			
		<p>(28) you get an air system in boots .. you can pump it up on the side of the tongue ...</p>			
	<p>(29) I've got an air cushion sole in my Docs</p>				
<p>...</p> <p>(30) what do all these pumps have in common?</p>				<p>(31) they all got air to ... it's all got to do with air</p>	
			<p>(32) they all pump something out</p>		
<p>(33) no water pumps haven't got anything to do with air</p>			<p>(34) petrol pumps haven't</p>		
		<p>(35) they all begin with pump</p>	<p>(36) but it's something - pumps</p>		
<p>(37) what is a pump then?</p>			<p>(38) it's something that you have to work</p>		
		<p>(39) it's like a heart pumping all your blood out</p>		<p>(40) yea your heart pumps</p>	
<p>(41) how?</p>		<p>(42) your heart pumps blood out</p>		<p>(43) it pumps the blood around</p>	<p>(44) it means it goes like that (<i>beats fist</i>)</p>

<p>(63) so what about the heart then?</p> <p>(68) where does it send it to?</p> <p>(73) why do you need blood to go round your body? (75) why?</p>	<p>(71) so when you die your heart stops beating and all the blood stops going round you</p> <p>(78) has it got calcium in it?</p>	<p>(77) feeds your bones</p> <p>(80) cos it mixes round with your food</p>	<p>(64) it pumps blood.. blood comes from all directions and it pumps it out again</p> <p>(66) in out in out .it's like recycling it</p> <p>(70) like petrol to keep a car moving like air to keep up bicycle tyres</p> <p>(79) keeps your muscles strong</p>	<p>(69) all parts of the body to keep the body moving</p> <p>(72) then it's preventing you from moving ... people have to lift you up cos you just flop cos no blood's going round</p> <p>(74) cos if you didn't have it you'd just ... (76) while it's moving it's keeping you</p> <p>(81) while it's going round it's helping you keep up circles</p>	<p>(65) used blood comes in and it's reused again</p> <p>(67) it goes out that way and comes in this way</p>
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<p>(84) so it's like blowing something up</p> <p>(86) why?</p> <p>(89) metaphorically speaking</p>	<p>(88) we don't know how to explain it we're going round in circles</p> <p>(90) oh no I said a metaphor</p>	<p>(82) it's warming you to move ..cos if you're freezing cold you can't move..so it's warming you up</p>		<p>(83) it's like water when it's just come out of the tap it can move but if you freeze it's just still</p> <p>(85) it gets right confusing</p> <p>(87) cos we keep going round in circles</p>	
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(Tape 11: lines 9 - 212)

