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A dialectical model of information retrieval: exploring a contradiction in terms

Clare Victoria Thornley

Department of Computer and Information Sciences

University of Strathclyde

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Declaration of authorship

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"The spirit of reconciliation, the Quaker librarian breathed.

There can be no reconciliation, Stephen said, if there has not been a sundering."

(Ulysses, James Joyce, chapter 9: Scylla and Charybdis.)

Preface

Information Retrieval (IR) has two main research traditions. These are the empirical or quantitative tradition, which deals primarily with symbol manipulation and matching and does not explicitly concern itself with the problem of meaning, and the cognitive or qualitative tradition, which proposes that the problem of meaning is central to IR. This thesis discusses the basic principles of both these research traditions and concludes that meaning is central to IR and plays an important part in IR research. The empirical tradition often uses mathematical or logical models as a theoretical basis to its work whilst the cognitive tradition tends to use theories from philosophy, psychology or sociology. The theoretical approach taken in this thesis is philosophical rather than mathematical.

The nature of the subjective/objective relationship in meaning is discussed in relation to work in the philosophy of meaning and the issues raised in this analysis are then used to investigate the role of meaning in IR. On the basis of this discussion a dialectical model is developed which provides a new analytical tool for investigating IR problems in terms of their relationship to the dialectical nature of meaning.

Abstract

Information retrieval (IR) is the process of representing the meaning of documents so that people who want the information they contain can retrieve them. It is, therefore, centrally concerned with information and meaning. It is concerned with them both on a pragmatic level in terms of designing and making IR systems, and on a theoretical level in terms of why and how these systems work and what this could have to do with the nature of meaning and information. This thesis is primarily about the theoretical and philosophical issues in IR.

The main question discussed is the extent to which an investigation into the relationship between the subjective and the objective can improve our understanding of how meaning and information operate in IR. My thesis is that this relationship is a dialectical one, the subjective and the objective exist in a mutually antagonistic and dependent relationship, and that this new perspective on its nature can be theoretically useful for IR. Thus I develop a new theoretical perspective, the dialectical model, which is then used to improve conceptual clarity in a number of difficult and intractable IR problems. The aim is not to solve these problems but to provide a clearer insight into their nature

The problems explored are: how to develop a theoretical framework for IR; how to represent the meaning of documents; how to evaluate or test these different meaning representation techniques. It has proved very difficult in IR to provide a theoretical understanding of why or how meaning representation techniques work (or don't) and also to find a way of measuring their performance which is both reliable and valid. I argue that a clearer perspective on these problems and the ways in which they are (and are not) related can be provided by the dialectical model. Thus, when they are seen as part of the dialectical relationship between the subjective and the objective, as manifested in meaning and information, their complex and often contradictory qualities appears less puzzling. Research to resolve these problems has proved problematic because it is often an attempt to synthesise the dialectical relationship between the subjective and the objective. This is both necessary, to an extent, because meaning and information require

a connection between the subjective and the objective, but also impossible and inherently unstable, because they also require a separation. They are both mutually dependent and in conflict.

The main conclusions drawn from this investigation are that philosophical approaches to IR are potentially helpful in improving theoretical clarity but that this has, so far, been hindered by a failure to acknowledge the central role of conflict and paradox in meaning and information. The dialectical model is an improvement on previous work in this area because it provides a way of working with the many contradictory concepts within IR without trying to create an untenable synthesis. This can help provide new insights into IR both on its own terms and also through the ways in which it relates to philosophy.

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1 Introduction

Information retrieval (IR) requires that the meaning of documents is represented in such a way that they are able to provide information. This has proved a very difficult process to successfully implement and an even more difficult process to understand. In this thesis, I argue that a dialectical understanding of meaning and information within IR can provide a productive new theoretical framework for understanding IR. A dialectic is a relationship in which two opposing forces exist in a tension between mutual antagonism and dependence. IR is about how documents (or any other information items) are represented in information systems in order for users, who would find these items relevant, to be able to retrieve them. In this thesis it is mainly understood as textual IR rather than, for example, speech or image retrieval. This is both to provide a clear focus for the thesis and because text is still the most common subject of IR. The problem of meaning as it relates to speech and images has some differences from those concerning text and this could be the subject of future work.

IR takes place under the broader subject areas of information science (IS), library science and also computer science. The focus of this thesis is IR from the IS perspective although the theoretical implications of computer technology are discussed. In modern usage an information system normally implies a computerised system but the problem of deciding what documents are about, and then representing and ordering this information is a general one and not totally dependent on the medium of representation. It is a problem of meaning in terms of deciding what a document is about and a problem of information in terms of whether a document causes a user to become informed or not. It involves both objective physical systems and texts and also the subjective experience of the person using them. The problem of understanding and managing the relationship between these two aspects of IR is both very interesting and also very difficult.

It is interesting because it raises many intriguing philosophical questions, and it is difficult because these questions generally do not have straightforward answers. In this

thesis I argue that the main question it raises is the nature of the relationship between the subjective and the objective and that the problem of meaning, and also of information, can be understood as a product of this relationship. The primary focus of this thesis is meaning, but the importance of information, its relationship to meaning, and how this affects the subjective/objective relationship, is also crucial to IR and this is discussed in some detail.

The hypothesis of this thesis is that this subjective/objective relationship is a dialectical one, which means that it is characterised both by conflict and mutual dependence. A dialectical model is proposed, which is a development of my earlier work (Thornley and Leon, 1999), and this is used to provide a new theoretical perspective for IR. Discussion on language and meaning, throughout history, has always had an interesting relationship to both conflict and community. In the biblical story of the Tower of Babel (Genesis, 11:1-9), humanity is united by one language and, aspiring to divinity, tries to build a tower up to heaven. God punished man for his pride by scattering him all over the world with different languages. Thus unity in language led to conflict with God and peace with God required differences and conflict in meanings. The tower was called Babel because the name 'Babel' sounds like the Hebrew for confused. Language and meaning have long been understood to exist between the forces of unity and the forces of division.

1.1 Motivations

In my view one of the dominant themes in IR research is that of unresolved conflict between and within different techniques, methodologies and theoretical perspectives. I argue that this is because the paradoxes and the contradictions of its subject matter, meaning and information, have, so far, been inadequately explored. Thus the motivation for this thesis was to investigate the nature of these conflicts and see if this could lead to a deeper understanding of IR. In particular it is argued that these difficulties normally arise because there is a limited understanding of the role of conflict and paradox in the relationship between the subjective and the objective and a subsequent failure to relate this to meaning and information. If we look again at the relationship between the

subjective and objective in IR, in a way that does not shy away from its conflicting and contradictory nature, will some progress in our understanding be achieved?

The overall aim of the thesis is to ascertain if an exploration of this question can make a contribution to theoretical clarity in IR. What, however, is meant by theoretical clarity? My understanding of such clarity is that it is a better understanding of how all the different aspects of IR, which can generally be characterised within the subjective and the objective divide, are related. As Buckland (1991) argues:

> "Information systems (and their users) form a system of interacting parts. We should expect that the relationship among these parts will constitute a major part of any adequate description or theory of information systems." (Buckland, 1991, p.27)

Thus, theoretical clarity can be gained by improving our understanding of the relationships within IR. My hypothesis is that this has proved difficult because the nature of many relationships within IR is one of paradox and contradiction. It is difficult, therefore, to understand their nature unless one has an interpretative model which can handle relationships containing both conflict and mutual dependence. This is what the dialectical model provides.

Hjorland argues that IR cannot progress until it is released from the constraints of the subjective/objective divide.

> "In my view, the fundamental problem for IR (as well as for IS as a whole and for many other disciplines) is that it has been caught between individual objectivism and subjectivism. (Subjectivism corresponding to what Frohmann, 1990, criticises as "mentalism" in IR). A third approach seems mandatory." (Hjorland,1998b, p.20)

My argument is that IR cannot progress until it is realised that being "caught between" these two forces is both essential and destructive for IR. What is needed is not necessarily a third approach to synthesise them, as Hjorland later suggests, but rather a new way of

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looking at existing approaches that does not demand a resolution of the conflict between them.

So the motivation for this dissertation was to provide a new theoretical perspective of IR through a different kind of understanding of how the relationship between the subjective and the objective might work. Does IR, however, really need any more theoretical perspectives? What is wrong with the ones that it already has? Why, given the wide ranging nature of theoretical work in IR, is there still a perception within parts of the IR community that this is somehow not good enough?

This dissatisfaction with theory appears to be most prevalent in the more user orientated research tradition in IR and is seen, for example in the recent work of Hjorland (1997, 2000a, 2003b) and Blair (1990, Blair and Kimbrough, 2002). It has a long history as over 20 years ago Brookes (1981, p.1) lamented that despite having the "most analytically gifted and theoretically inclined minds in the whole information business" the level of theoretical development in IR was very disappointing. Ellis (1992a) uses Kuhn's (1970) criteria for a successful research area, i.e. one in which a clever person cannot fail to succeed, as evidence of how far away from this happy state current IR research currently resides. This concern, however, is not totally restricted to the more qualitative tradition in IR. It also exists within the mathematical or objective tradition in IR. In her early work in 1981 Sparck Jones argues, in her investigation into IR testing, that the whole of IR can be seen as a largely unsuccessful attempt to progress from descriptive theories to explanatory ones. In her more recent review (2000) of the large scale IR testing conference, TREC[1] (Text Retrieval Conference), she claims that progress has been made from descriptive statements about IR to prescriptive ones but that explanation has still not been developed. Thus concern about theory, though it is not universal, does exist in IR.

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[1] TREC provides a large-scale document collection which different research groups use to test their IR systems and the results are presented at the annual TREC conference. Available from: <http://trec.nist.gov/pubs.html>.

My thesis is that there is what could be called a 'theoretical deficit' in IR and also that this does matter. It matters because, in my view, IR does not currently have a clear view of itself and this lack of clarity produces confusion about what it is doing and why. This lack of clarity is essentially a philosophical problem by which I mean it cannot be solved by merely collecting more data but through learning to see the existing data in a new way. As Saracevic (1999) argues, library and information science (which would include IR), is more in need of organising its existing data than collecting yet more.

> " Scientist-Poets wanted: I see the field of library and information science (L&IS) as highly centrifugal and greatly in need of high quality syntheses. Library and information science has always been easy to enter by persons trained in other disciplines, particularly if they bring a quantitative skill. The pattern has been many fresh starts by new entrants rather than strong cumulation. Nor is there full agreement as to which work is paradigmatic. Therefore, I would give warm encouragement to writers who show a talent for creative integration and criticism of ideas already in the literature. Their efforts should go into reading and organising *existing* claims, rather than gathering new data." (Saracevic, 1999, p.1052)

This thesis uses philosophical methods in a new way to try and provide this new perspective for IR, and also paradoxically, to show how the synthesis which Saracevic so devoutly wishes, is probably not possible. Indeed to extend his centrifugal analogy, an understanding of the forces pulling information and meaning, and thus IS and IR, apart will also show what binds them together, as a centrifuge uses force to separate out and concentrate what is required. Philosophy so far, in my view, has rarely been put to work properly in IR. What kind of work could philosophy reasonably be expected to do and indeed what is the purpose of philosophy? Wittgenstein (1922) claimed that philosophy is acts of clarification.

> "Philosophy is the logical clarification of thoughts.
> Philosophy is not a theory but an activity.
> A philosophical work consists essentially of elucidations." (Wittgenstein, 1922, 4.112)

Philosophy then, can be understood as a tool or an activity that is used to explore problems but what is a philosophical problem? Harre (2001), in his analysis of Wittgenstein, argues that philosophical problems are both perennial and intractable. This is not necessarily because they are hard to solve but because they are hard to see clearly. We find it hard to see them because they are caused by confusion in our use of language. This is so integral to our way of being in the world that we tend not to notice it. Thus Wittgenstein argued that philosophical problems are conceptual confusions that were normally caused by our misunderstanding of how meaning works. This results in a sense of being lost and a lack of clear direction

"A philosophical problem has the form: 'I don't know my way about'."
(Wittgenstein, 1953,123)

" What is your aim in philosophy?- To shew the fly the way out of the fly-bottle."
(Wittgenstein, 1953, 309)

Working in IR often gives rise to similar problems of direction and purpose. Marcella and Baxter *et al.* (2002), claim that IR's theory problem is not lack of theory as such but "rather the lack of a road map guiding us through the theory" (p.192). I argue that we get lost in IR because the map of meaning we use is often the wrong one for the research territory.

Philosophical problems are about the fundamentals of our activities and thoughts and philosophical enquiry works to reveal what underlies them. Priest (1990), in his textbook on British empiricists, describes the important distinctions between philosophy and other disciplines. Philosophy calls into question the assumptions that most disciplines take for granted.

"Whilst other subjects and everyday life continue with more and more explanations, more and more information, more and more criticism, philosophy invites us to halt abruptly and ask what we are doing. Other subjects build higher and ever more complex buildings. Philosophy takes us down to the basement to examine the foundation." (Priest, 1990, p.11)

Wittgenstein also uses a building analogy.

> "Where does our investigation get its importance from, since it only seems to destroy everything interesting, that is, all that is great and important? (As it were all the buildings, leaving behind only bits of stone and rubble.) What we are destroying is nothing but a houses of cards and we are clearing up the ground of language on which they stand." (Wittgenstein, 1953, 118)

Philosophy is therefore an activity, which may appear to be destructive but it is through this dismantling of assumptions that a new understanding can be created. Philosophy is often constructive by means of destruction. It deals with paradoxical problems and is often a paradoxical activity.

It is my view that the role of paradox and conflict within philosophy has been inadequately utilised by IR. Philosophy can be understood as the struggle to understand our subjective place in an objective world. How does what we think and say relate to what actually is? This can be seen throughout philosophy from the dialectical arguments of Parmenides (Plato, Trans.Warrington,1961) up to the present. Nagel (1986) argues that nearly all philosophical problems are a manifestation of this central relationship. Indeed Anscombe (1981), who edited and translated much of Wittgenstein's work, argues that Parmenide's discussion on the relationship between 'what is' and how we can understand or know about 'what is' forms the basis of much current philosophy.

> "At the present day we are often perplexed with enquiries about what makes true, or what something's being thus or so *consists in;* and the answer to this is thought to be an explanation of meaning. If there is no external answer, we are apparently committed to a kind of idealism.
> Whitehead's remark about Plato might, somewhat narrowly, be applied to his great predecessor:
>
> Subsequent philosophy is footnotes on Parmenides." (Anscombe, 1981, p.xi)

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I argue that IR has failed to use some of the central conflicts in philosophy and also that it has failed to have an adequate historical perspective on the ways in which different philosophers are related. Indeed I am not aware of the extensive use of any philosophers earlier than the twentieth century. Thus in IR there has often been a failure to acknowledge the importance of the way in which philosophy works on conflicting and contradictory issues and also the importance of the relationships between different philosophical ways of exploring these questions. In terms of a dialectical perspective, both the conflicts and the connections in philosophy must be understood together. Work in the philosophy of meaning does not take place in isolation but is part of a wider historical and theoretical philosophical context in which the essential contradictions of human experience are examined. Thus the relationship between the subjective and objective is an important way of understanding the relationships between different areas of philosophy.

Philosophy explores this difficult relationship in many different ways, often through the unravelling of paradoxes and contradictions. Wittgenstein's work, for example, cannot just be characterised by a shift from the logical to the sociological in meaning, as Hjorland (1998b) argues. The assumption that this shift was absolute and complete, rather than a different emphasis on the complex and contradictory relationship between content and use, is over simplified and unsatisfactory. Indeed part of my thesis is that change, whether of one's mind as Hjorland claims about Wittgenstein, or of anything else, involves both a rejection of what was and also a dependence on it.

Philosophy has already been used in IR and Wittgenstein is one of the most cited philosophers. Blair (1990, Blair and Kimbrough, 2002) develops a model of IR based on Wittgenstein's views on the role of context and pragmatics in meaning. Hjorland's (1997, 1998a) detailed analysis of the relationship between philosophical perspectives in IR and IS suggests Wittgenstein's philosophy as a way of synthesising the subjective and objective traditions within IR. Other philosophers have also been used such as

Bonnevie's (2001) work to develop a meta-theory using Dretske and Raber and Budd's (2003) work using Saussure to explore indeterminacy in meaning.

This work generally uses philosophers who have done work on meaning and then tries to apply it to IR. In my view this process of application has had mixed results and this is perhaps because the difficulties and complexities of what applying philosophy to IR might actually mean have not always been adequately thought through. There is tension in the application of philosophy between over-ambition in terms of claiming that philosophy can solve or resolve theoretical and practical issues for IR and under-ambition in terms of just using it as an object of comparison or analogy rather than as an investigative tool. I argue that, in terms of a dialectical understanding, the differences and conflicts between philosophy and IR need to be investigated or, to put it another way, it is important to really investigate whether the proposed analogies and comparisons do, in fact, withstand analysis. Thus, in one sense the use of philosophy in IR is a dialectical process caught between conceptual analysis and the pragmatics of IR implementation. In both these cases a natural desire for synthesis and solutions can actually act as an impediment to clarity.

Comparing IR to philosophy has expanded our understanding of the philosophical hinterland of IR and some of the ways in which philosophical problems may be related to IR problems. It has not, however, in my view made substantial progress in analysing the reasons why IR remains so theoretically intractable. Research in this area is often characterised by a desire to solve or resolve the problematic nature of IR. Hjorland (2003a), for example, forcefully rejects claims that philosophy has no useful practical purpose in IS and IR. A new change in focus is perhaps suggested by more recent work (Basden and Burke, 2004, p.353) using the little known Dutch philosopher, Dooyeweerd. In their paper they explicitly acknowledge that they are not taking the conventional approach of using a philosopher's work to solve the problem of documentation under consideration but rather to shed new light on it. My own approach is similar to this in that the emphasis is on providing a new perspective rather than the resolution of practical IR problems. I differ from Basden and Burke (2004) in so far as they wish to use philosophy

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to resolve the theoretical tension between the subjective and the objective, whilst I wish it to use to show the different ways in which this is not possible. In fact, in IR and IS the assumption that a clear view of a problem will enable it to be resolved, either theoretically or practically, appears to be incorrect.

My argument is that a clear view of IR will not necessarily or indeed probably lead to the solution of IR's practical or technical problems and also that a clear view of IR will not, in fact, be clear unless it is one which can deal with conflict and contradictions. The laudable aim to solve IR problems by providing a complete and coherent conceptual framework for IR, has in fact, not lead to increased theoretical clarity because, in my view, IR is just not the kind of thing that can helpfully be contained within such a framework. The very application of such a framework leads us away from understanding IR because it does not acknowledge its contradictions and conflicts. There is a tension between the desire for a theoretical resolution and the desire for theoretical clarity. An investigation into why this may be the case is one of the most productive methods of increasing understanding in IR. As Wittgenstein argues, it is not philosophy's job to resolve contradictions.

> "It is the business of philosophy, not to resolve a contradiction by means of a mathematical or logico-mathematical discovery, but to make it possible for us to get a clear view of the state of mathematics that troubles us: the state of affairs *before* the contradiction is resolved. (And this does not mean one is side-stepping the difficulty)……. The civil status of a contradiction, or its status in civil life: there is the philosophical problem." (Wittgenstein, 1953, 125)

In summary, then, the motivations for this thesis were the observation that conflict and paradox played an important role in IR, the hypothesis that this conflict could be dialectical, and the belief that a philosophical investigation could increase our understanding of what this means.

1.2 What this thesis is about

The problem under investigation then, is how the relationship between the subjective and the objective operates within IR, and the implications of this for the role of meaning and information. My hypothesis is that a new model for IR, which sees this relationship as a dialectical one, can help increase our understanding of how this relationship works within IR. Thus, at the most general level, the research question is "does interpreting IR as a dialectical process between the subjective and the objective increase our understanding of IR or not?". Do aspects of IR, which currently seem paradoxical and contradictory, appear less puzzling when seen as a dialectical process? The approach I take to this question is a problem-based one as described by Buckland (1991).

"Good research is orientated towards problems. These can be conceptual (intriguing paradoxes, apparent inconsistencies), or practical (inadequate tools)." (Buckland, 1991, p.21)

The particular IR problems that this dissertation focuses on are the nature of IR theory, the problem of meaning representation, and the problem of evaluation or testing of IR systems. The problem of theory is understood as the question of why IR chooses certain models for its systems and the possibility or otherwise of providing an explanatory or conceptual framework for this process. The problem of meaning representation is how to actually implement these models as techniques and the problem of testing or evaluation is how to find out the extent to which they have worked. In my view these problems and the way they are related certainly qualify as containing both paradoxes and inconsistencies. This often results in the use or production of inadequate tools but my focus is on the problems at a conceptual level. In each case the dialectical model is used to examine the extent to which these problems can be understood as products of the dialectical conflict between the subjective and objective. I argue that all these problems are centrally concerned with meaning and information and that these concepts both contain dialectic conflict and are also often in dialectical conflict with each other. Thus the reason why IR often seems paradoxical and contradictory is because of the paradoxical and contradictory nature of its subject matter which is meaning and information. The reason these problems

often appear paradoxical is because they contain conflict within them and the reason that they are intractable is because this conflict is dialectical. Any effort to resolve these problems tends to be unsatisfactory, both theoretically and practically, because a resolution often denies the importance of either the subjective or the objective part of the conflict. The difficulty in IR is not so much that a particular theory, a particular technique, or a particular testing methodology is wrong, rather that any approach that purports to be a resolution will only contain a partial understanding of the problem. My argument is that meaning and information defies this kind of resolution and that they must be understood in a way that does not require closure.

Thus, to summarise, the more specific research objectives are as follows. Firstly, to gain a new understanding of the relationship between the subjective and the objective based on the dialectical model. Secondly, to gain a new understanding of how this relationship exists in meaning and information, and its impact on IR. In order to achieve these objectives a new understanding of the role of models *vis a vis* theories in IR is provided. This also contributes to a different understanding of the possible role of philosophy in IR and thus a new perspective on the inter-disciplinary nature of IR. The research outcomes of this thesis are therefore, theoretical or conceptual, rather than practical or technical. The most general research objective of this thesis is to improve theoretical and conceptual clarity in IR. Thus, there is an assumption, as discussed previously, that the current state of theory in IR is somehow unsatisfactory. This thesis is a contribution to our understanding of why this might be the case. The aim to is to provide a new perspective or way of seeing the existing landscape of IR.

> "The aspects of things that are most important to us are hidden because of their simplicity and familiarity. (One is unable to notice something because it is always before one's eyes.) The real foundations of a man's enquiry do not strike a man at all. Unless *that* fact has at some time struck him. -And this means: we fail to be struck by what, once seen, is most striking and most powerful." (Wittgenstein, 1953, 129)

How can the success or failure of this theoretical enterprise be judged if there may be no practical implications? It can only be assessed by an analysis of its contribution to

theoretical clarity. If a philosophical problem is characterised, as Wittgenstein argued, by not knowing our way about then does this thesis help us find our way in IR?

1.3 Method and structure

The basic methodology of this thesis is theoretical and conceptual analysis, which can be understood as part of the philosophical tradition. There is no data collection in the conventional sense because, in my view, IR is more in need of a new interpretative framework than more data. The data for my model already exists within IR; what is required is a new way of interpreting it.

The dialectical model is specifically an interpretative model or way of seeing, rather than a theory or a way of explaining causal factors within a framework. Part of my thesis is that it is the desire for such theories, particularly when they are claimed to be scientific, which is an important factor in IR's theoretical difficulties. I agree with Hjorland (2000a) that IS and IR are characterised by models, which can't be falsified, rather than by theories, which can. I differ from Hjorland, however, in that I think that this is not necessarily a weakness as long as it is acknowledged. The weakness arises when models are assumed to behave like theories even though they, in fact, can't really be tested and can't really explain. The belief that IR could have falsifiable explanatory theories, in the way that Popper (1968) argues is essential for science, reveals a lack of insight into the nature of meaning and information. Thus in this thesis there is often a dialectical tension in the ambition to improve theoretical and conceptual clarity and the recognition that this can only be a partial and fragmented picture. My aim has been to make this an explicit tension and thus not a destructive one. It can be understood in a similar way to Putnam's (1991) views about understanding meaning and mental states (intentionality).

> "What I want to present is not, indeed, a 'theory' in the sense of which the scientific realist hopes that it will be possible to construct a theory of intentionality. I do not see any possibility of a scientific theory of the 'nature' of the intentional realm, and the very assumption that such a theory *must* be if there is anything 'to' intentional phenomena is one that I regard as wholly wrong…..What I can offer is less than a theory, to be sure, but it is a picture that enables us to make sense of a variety of different phenomena.   (Even

Wittgenstein allowed himself to hope for a "perspicuous representation", after all.) The important thing, it seems to me, is to find a picture that enables us to make sense of the phenomena from within our world and practice, rather than to seek a God's Eye View." (Putnam, 1991, p.109)

I argue that what is interesting about IR is the philosophical problems that it contains and that theoretical progress can be made by analysing these problems in terms of the dialectical model. In order to facilitate this some background and context is provided to the issues that IR raises and the ways in which they could be approached. The philosophical background to these problems is introduced in chapter 2, which critically analyses how the problem of meaning has been addressed in philosophy. This chapter discusses how philosophy has tackled the nature of the subjective/objective relationship in meaning and explores the kind of questions that this raises. Chapter 3 extends this debate into the realm of information science and discusses what information science actually means. This includes a discussion on whether IS is a science or not and the extent to which this is connected to its relationship to both meaning and information. This debate is important to clarify as it has crucial implications both for our understanding of the relationship between the subjective and the objective in IS and for the nature of research activity in IS and thus also IR. The next chapter, chapter 4, examines the role that meaning plays in IS. At this stage in the thesis discussion about the important distinctions and relationship between meaning and information and their role in understanding the subjective/objective divide in IS and IR becomes more prominent. It is argued that both IS and IR require a relationship between information and meaning, and that this has particular implications for how the subjective/objective divide operates in these disciplines. Chapter 5 investigates the role of meaning in IR and critically examines the current use of philosophy in this area.

Thus at the close of chapter 5 a historical and philosophical context has been provided as to how the relationship between the subjective and the objective, as manifested in meaning and information, has been discussed so far in philosophy, IS and IR. The next chapter, chapter 6, introduces a new way of looking at this problem; the dialectical

model. A history and overview of the concept of dialectic is provided and the role that it could play in meaning and information is discussed. Chapter 7 is a detailed analysis of three IR problem areas in terms of the model: IR theory; meaning representation; testing and evaluation. These problems, and the complex relationship between them, are discussed in terms of the dialectical model. The question considered is "can we make more sense of these problems when we see them as a product of the dialectical relationship between the subjective and the objective?". Finally in chapter 8, the utility of the model is assessed in terms of the extent to which it has increased conceptual clarity in these areas and the implications for future work are discussed.

1.4 Bibliographic note

Some of the philosophers cited in this thesis have particular referencing conventions. Wittgenstein's work is often in numbered paragraphs and the number after the dates in the references citing his work refers to a paragraph unless a page number is explicitly given. Plato, Aristotle and Saint Augustine are also cited using paragraph numbers so that the quotes can be located in any translation or edition of their work. I have included the dates, where possible, of the original texts of many of the translated works cited in this thesis in order to provide the correct historical perspective on their contribution. All italics in the quotes used are those of the author.

Some of the philosophical papers cited are from an anthology of work on meaning in philosophy. In these cases the page numbers refer to the analogy but details of the original source are also provided.

2 Meaning in philosophy

This chapter examines the different ways in which philosophy has tackled the problem of meaning. The central problem under investigation can be defined as understanding how words, which appear to be objective, can carry meaning, which appears to be subjective. Another perspective on this problem is to see it as the question of how symbols or signs, which appear to be objective, can actually signify or stand for something in a way which produces meaning. It is about clarifying the nature of the relationship between these two seemingly different, but necessarily related, elements of language. The rules specifying the ways in which these symbols can be validly ordered and arranged are known as syntax. In terms of meaning, both the symbols that are used and the way in which they are ordered have an impact. Thus symbols and syntax have an important connection to meaning or semantics but they must also remain distinct from it. A sign or a symbol is not the same thing as that which it represents. It must, however, have a relationship with it or it can no longer function as a sign. This concern with distinguishing between signs and what they signify has a long history in philosophy and theology. Saint Augustine, in his discussion on idolatry in *On Christian Teaching* (Book 3,30, Trans. Green, 1997), warns "someone who attends to and worships something which is meaningful but remains unaware of its meaning is a slave to a sign". He therefore sees it as a sin to conflate the sign with what it represents. Thus, for Augustine, and also within some other religious traditions, the failure to distinguish between a sign and what it represents has ethical as well as philosophical implications. A reverence for the external form without a corresponding inner conviction or understanding is seen as unacceptable. The limits of words in expressing content are also considered in poetry. In his poem *In Memoriam* (1850, section 5), an elegy for his friend, Tennyson acknowledges his disquiet about writing the poem.

"I sometimes hold it half a sin
To put in words the grief I feel;
For words, like Nature, half reveal
And half conceal the soul within."

The fascination of meaning for philosophy is partly because an examination of this subject raises so many other interesting philosophical questions. In terms of Saint Augustine's example, how can we know that someone has conflated a sign with what it represents and what are we to make of those who think that the sign represents nothing? In order to examine questions of this nature it is necessary to explore the nature of consciousness, or the subjective experience of meaning, and the way in which it can relate to external objects, which may or may not even really exist. There is also the question of how we can ever know what another person is thinking: how can we be sure if their experience of meaning is similar to ours? Thus, even if we feel it is possible to have an understanding of the subjective experience of meaning, there remains the question of how we can know whether this has been accurately communicated. This problem of the shared knowledge of meaning is manifested at a more general level in the issue of whether it is ever possible to transcend our human perspective on meaning and develop a comprehensive theory or overview of meaning. Thus an investigation into meaning requires an analysis of: the nature of human consciousness; the nature of our relationship with other people; the nature of our relationship with the world and abstract ideas; and the metaphysical issue of just how far our understanding of these questions can be developed. Any proposed solution to one of these issues has a strong tendency to simply raise more questions about the nature of one of the other issues.

Different philosophers have placed different emphases on these various aspects of meaning and have also interpreted them in different ways. The central distinction between the subjective and objective aspects of meaning pervades all of these questions. In meaning there is both an inner or subjective experience and an external or objective reality. The former is generally understood to be some kind of individual mental experience, although different philosophers have different views on how this experience should be described. The latter concerns both the objects in the world, abstract ideas which are described or named in language, and the social or collective aspects of meaning. The objective or external aspects of meaning are seen to have an important function in providing a context in which it is possible to check that meaning is being used

consistently. This area of meaning is known as the normative aspect of meaning and it is concerned with the ways in which meaning is prescriptive rather than just descriptive. Meaning requires a way of knowing that words are used consistently to apply to the same, or at least similar, objects or activities. In one sense meaning can be open to interpretation; this can only be to a limited extent, however, or meaning would become random and thus meaningless. Meaning must be normative and to achieve this it has to operate through some kind of system of shared rules. Arguments about the nature of these rules and their practice are often an important part of a particular philosophy of meaning. Finally, a question that involves both the subjective and objective is our ability or otherwise to develop a theoretical structure for meaning: can our subjective experience of meaning be used to develop an objective understanding of how it works?

In order to address these questions it is necessary to examine the nature of consciousness, the nature of our relationships with others and the world, and also the limits of our knowledge and understanding of both the world and ourselves. Thus to ask the question "What kind of thing is meaning?" is also to ask the question "What kind of thing is a human being?". The discussion within the philosophy of language can be understood as a debate on this issue that also tends inevitably to raise the question "What kind of thing should a human being be?". Thus discussion in meaning is often to some extent normative or political, as well as descriptive or explanatory, because it does include views on the nature of the individual and his or her relationship to society.

Philosophy of language is often divided up into theories of reference, which consider the way in which words gain meaning by referring to objects, and theories of use or social practice, which consider how our social and physical context give words meaning. The subjective/objective distinction generally operates throughout these two traditions and can be used to clarify the nature of the arguments in each perspective. Firstly this chapter will examine the reference approach, which concentrates on how the relationship between words and objects provides meaning. Secondly it will examine the approach which concentrates on how social relationships and context provide meaning. The purpose is to

provide a clear portrayal of the important issues in meaning and an indication of how they are related to other philosophical problems.

2.1 Meaning as reference

This philosophical perspective argues that words have meaning because they refer to, or in some way stand for, objects. The philosophical investigation into meaning then needs to examine the exact way in which this reference relationship operates and the exact nature of the objects to which words refer. At its most general level this approach can be seen in Plato's theory of forms, in which he argues that objects have qualities or characteristics by virtue of the extent to which they participate in abstract forms. In Plato's *Phaedo* (Trans. Tredinick, 1969), for example, it is argued that a person is beautiful if he participates in the form of beauty. He is beautiful because of his relationship to the abstract form of beauty. In order to understand this better we must not examine the particular instance of beauty but we should study it in its abstract form. This leaves the difficult problem of determining how an individual instance can relate to a general abstract entity, which is also known as the problem of universals and particulars. It is discussed in Plato's *Parmenides* (Trans. Warrington, 1961) using numerous problematic cases such as whether the form of 'large' must itself become 'small' if it is to be able to participate in many large things. This difficulty can be seen as a problem of contradiction in terms of how a large thing can also be small. It can also been seen as the problem of how something can share in the quality of largeness whilst not actually being identical with largeness. In meaning this problem is expressed in the difficulty of how a particular word can relate to its more general or abstract meaning. A word can be understood as a specific instance of meaning but it must relate to something more general than itself because language requires the ability of words to transcend the particular. That is part of what a word must do. A word's meaning must also be recognised by the language user: we must be able to know and recognise that it does, in fact, refer to something. There are, then, two main philosophical problems within the reference theory of meaning. It has to be able to explain how a word can refer to an object and it has to be able to explain how we are able to know or recognise the nature of this relationship, The first is a problem of knowledge as it relates to the external world, and the second can be

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seen as a problem of knowledge as it relates to our internal mental state. There are, therefore, two sorts of objects in this theory, an external object and an inner object or thought. This section will begin with an examination of different philosophers' views on the nature of these objects, their relative importance, and the relationship between them.

2.1.1 The nature of the reference object

The initial problem with the reference theory of meaning is clarifying what exactly a word needs to refer to in order to have meaning. This can be understood as the tension between intension and extension (Putnam, 1973). Understanding a word is knowing its intension, which is the mental state of understanding or recognition that happens when we use a word. In one sense the word's meaning derives from the way in which it refers to this mental state. The extension of a word is the object it refers to in the world. Thus for a word to have meaning it needs to refer to two things: firstly the mental event of understanding, and secondly the external object which it names. Another way of understanding the intension/extension distinction is to see intension as the qualities of an object and extension as the set of all objects that have those qualities. Thus intension is generally understood to be subjective and qualitative, and extension as objective and quantitative.

In *De Interpretatione*, Aristotle (chapter 1.5, Trans. Ackrill, 1963) outlines the differences between signs, the internal experience of a sign, and the object the sign refers to:

> "Now spoken sounds are symbols of affection in the soul, and written marks symbols of spoken sounds. And just as written marks are not the same for all men, neither are spoken signs. But what these are in the first places signs of - affections of the soul - are the same for all; and what these affections are likenesses of - actual things - are also the same."

For Aristotle the "affection in the soul" or the mental experience of a sign could be understood as a likeness or copy of the actual thing the sign stood for. This raises the problem of explaining the relationship between the inner or mental experience of meaning and the physical object to which the meaning refers.

Frege (1892) was one of the first more modern philosophers to return to this distinction between the subjective and the objective in meaning. His theory of meaning is confined to the qualities of names, which he defines as singular noun phrases that refer to a particular thing. Thus his theory is limited in scope but these limits are explicitly articulated; sentences contain a name that will refer to something. There are also parts of the sentence which are not names, e.g. words such as 'and' and 'that', and these also have a bearing on to what the sentence refers. He argues that a name has both a sense and a reference. The reference of a name is whatever thing the name is used to refer to. It is knowing the reference of a name which can determine the truth or falsity of the sentence in which the name occurs. Knowing the reference of a name, however, does not mean that one has understood the name. In order to understand a name one must understand its sense, which is what we grasp when we understand it. He argued that a name's sense can be understood as the way in which its reference is presented to us; when we grasp the sense we think of the reference in a certain way. It is possible to have two names with the same reference but a different sense. He uses the example of the morning star and the evening star to illustrate this (Frege, 1892, In: Moore,1993, p.28). In fact both these names refer to the same star but language users may call it different things and thus it has more than one sense. Articulating the exact way in which two observers of the same star may have the same reference and the different senses is not trivial. It implies that in some way they have a different mental experience but, as they are seeing exactly the same thing, it is difficult to see of what this difference could consist. One possible interpretation is that, as the internal name given is different, that this somehow causes a distinctive mental experience.

His theory of communication provides some elucidation on the exact nature of a name's sense. He argues that in order for communication to succeed it is necessary that two people grasp the same sense. Thus, although sense is a mental experience it is not an intrinsically private one; it must be capable of being shared. This has an interesting resonance with Wittgenstein's (1953, 275) private language argument. Wittgenstein also claims that language can never be intrinsically private because a private mental

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experience has no connection to the social and external constraints that are necessary to enforce the consistent use of meaning. Frege rejects the concept of private experience of meaning by specifically distinguishing between an idea and a sense:

> "The reference and sense of a sign are to be distinguished from the associated idea. If the reference of a sign is an object perceivable by the senses, my idea of it is an internal image, arising from memories of sense impressions which I have had and acts, both internal and external which I have performed. Such an idea is often saturated with feeling; the clarity of its separate parts varies and oscillates. The same sense is not connected, even in the same man, with the same idea." (Frege, 1892, In: Moore, 1993, p.26)

An idea is changeable and subjective; it can alter within one person over time and often varies between different people. Frege uses the example that "a painter, a horseman, and a zoologist will probably connect different ideas with the name '*Bucephalus*'" (Frege, 1892, In: Moore, 1993,p.26). A sign's sense can be seen as the "common property of man" and not part of the "mode of the individual mind". Senses are derived from the "common store of thoughts which are transmitted from one generation to another". It is possible for two people to grasp the same sense but not the same idea because the two ideas cannot be together in the same consciousness. An idea must belong to someone but a sense can exist independently from particular individuals. Thus an idea is an individual mental experience but this is not central to meaning; sense appears to be both an individual experience but one that is grounded in collective knowledge. This suggests, however, that in some way, it is possible to have ideas that are totally independent from our collective knowledge, which is a strong claim to make about the nature of individual mental experiences. Frege seems to argue that the sense of a name is somehow a method of establishing the relationship between the object and the idea in someone's head:

> "The reference of a proper name is the object itself which we designate by its means; the idea, which we have in that case, is wholly subjective, in between lies the sense, which is no longer subjective like the idea, but is not yet the object itself." (1892, In: Moore, 1993, p.26)

He uses the analogy of a person observing the moon through a telescope to clarify this relationship. The moon is the reference because it is the object under observation. It is mediated by the real image projected by the object glass in the interior of the telescope, which can be compared to the sense, and the retinal image in the observer, which can be compared to the idea. The optical image in the telescope is dependant upon the position of observation but it can be viewed by more than one person whilst the retinal image cannot (Frege, 1892).

The key distinction between an idea and a sense appears to be that a sense can be observed by more than one person whilst the retinal image cannot. This implies that private mental experiences do occur but that they are not that central to meaning. In this example the telescope provides the technology to create the publicly observable image but this does not explain the mechanisms for how senses become public in language.

Frege's work on meaning raises many interesting questions. The first question is the issue of how we can be certain that a reference is correct. This can also be seen as the difficulty in establishing the truth of a sentence. A sentence would normally be held to be true if the sense of a word corresponded accurately to its reference. In terms of reference this can be problematic because some words refer to things that do not exist; for example, unicorns. In common with many logicians, including Russell (1919), Frege was concerned about the confusion caused in our imperfect language when apparently proper names have no reference. In terms of the extent to which meaning derives from sense there is the problem of how senses, which appear to be mental, can be shared and communicated. If reference is external and sense is internal how is it possible to be sure that their relationship is an accurate one? He argues that it must be possible for senses to be shared in a public way or language would be impossible:

"Now if the sense of a name was something subjective, then the sense of the proposition in which the name occurs, and hence the thought, would also be something subjective, and the thought one man connects with this proposition would be different from the thought another man connects with it; a common store of thoughts, a common science would be impossible. It would be impossible for something one man said to contradict what another

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man said, because the two would not express the same thought at all, but each his own."
(Frege, n.d. In: Moore, 1993, pp.44-45)

In essence the argument seems to be that because we observe that language does work we have to conclude that senses are not subjective or at least not intrinsically private. Thus the theory begins with an observation of the workings of our language and draws conclusions about what must be the case in order for this to be possible. This is an interesting resonance with Wittgenstein's (1953) emphasis on the importance of accurately observing and describing actual language use in the philosophy of language, and also his particular views on the impossibility of a private language. Wittgenstein argued that if a language cannot be shared then it cannot be a language. Frege is claiming that we need the concept of sense to explain why language is distinct from that which it refers to, but we also need sense to retain a connection to the objective shared aspect of language. From one perspective meaning is an objective feature of how words are used and understood, but it is also more complex than a straightforward word/world relationship. The subjective experience of understanding must also be acknowledged. Frege's work provides a detailed analysis of these difficult issues, which provided the material for many of the philosophers of meaning in the 20th century. This chapter now proceeds to analyse what more recent philosophers have said about these issues and investigates the extent to which any progress has been made. Firstly it examines those philosophers who emphasise the importance of the objective aspects of the reference approach and then it proceeds to analyse the arguments of those that concentrate more on the subjective experience of meaning.

2.1.2 Objectivity in meaning

This approach to meaning concentrates on the problem of how meaning can be objective or successfully shared in a way that makes communication possible. Objectivity in meaning is generally understood to be anything that is external to an individual mental experience. Thus it has at least two components: objects in the world and other people.

Quine (1975) is a strong proponent of this objective view of meaning and his work is a sustained critique against an individualistic mental or subjective understanding of

meaning. He argues that meaning is a matter of observable behaviour and disposition to behaviour of language users. Thus there are two aspects of his view of the objectivity of other people: their behaviour, and their dispositions to behaviour. He claims that it is a "conspicuous fact that language is a social enterprise which is keyed to inter-subjectively observable objects in the external world" (Quine, 1975, In: Moore,1993, p.81). He criticises the mentalistic view of meaning, with its emphasis on the importance of the inner experience of meaning, because it is based on what Quine calls the illusion of explanation. This appears to be in a similar theme to Wittgenstein's call that "we should do away with all explanation, and description alone must take its place" (1953, 109). In Quine's case he is arguing that it is a fallacy to believe that mental experiences can explain meaning. He distinguishes between three possible levels of explanation: the mental; the behavioural; the physiological. These levels can also be seen as three processes of reduction: the mind consists of dispositions to behaviour and these dispositions to behaviour are physiological states. The mental level is superficial and does not warrant the name of explanation. The physiological level is the deepest and may be able to give causal explanations. In meaning, however, we need to content ourselves with the behavioural level at the present time. Quine's contempt for what he calls mentalism is very pronounced.

> "People persist in talking thus of knowing the meaning, and of giving the meaning, and of sameness of meaning, where they could omit mention of meaning and merely talk of understanding an expression, or talk of the equivalence of expressions and paraphrasing expressions. They do so because the notion of meaning is felt somehow to explain the understanding and equivalence of expressions. We understand expressions by knowing or grasping their meanings; and one expression serves as a translation or paraphrase or another because they mean the same. It is of course spurious explanation, mentalistic explanation at its worst. The paradoxical confusion between understanding 'eighty two' and knowing and giving its meaning is always symptomatic of awkward concept building; but where the real threat lies, in talking of meaning, is in the illusion of explanation." (Quine, 1975, In: Moore, 1993, p.82)

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Quine's argument here appears to be that in meaning what you see is what you get. There is not a hidden meaning behind what we say; there is just what we say. His separation of meaning into three levels is only a precursor to his claim that the levels are actually equivalents. He seems to share Wittgenstein's view that one of the worst sins in philosophy is to use a concept to posture as an explanation when it cannot fulfil that role. Quine is arguing that the appeal to mental experiences will never be able to explain meaning but that in the future we might be able to explain meaning by examining the neural mechanisms of behavioural dispositions. Mentalism posits a mental event behind our experience of meaning but this mental event cannot, for Quine, explain anything because it is no clearer than our concept of meaning. It just substitutes one mystery for another. Within his philosophy an explanation of meaning is possible in principle but we do not yet have the technology to collect the data and currently it remains hidden from our view. In contrast Wittgenstein is saying that one cannot in principle explain meaning because explaining implies looking for hidden causes and in meaning there are no hidden causes. The data is all around us; we just need to arrange it correctly.

Quine's behaviourist view of language involves the objectivity of external objects and also the behaviour of people who observe and name these objects. He is concerned with establishing criteria for judging whether someone has understood a sentence. The correct standard for judging the understanding of a sentence is the ability to give the truth conditions of the sentence, i.e. to describe the situation which would make the sentence true. This knowledge is expressed by the behavioural disposition of the language user. An understanding of the word 'red' consists of the disposition to assent or dissent when asked "is this red?" in the presence or absence of something that is red. This view of meaning then raises the question of what exactly are these dispositions to assent or dissent and how do we come to make these decisions.

Quine is a holist which means that he thinks that we make these decisions based on our inter-connected understanding of language and context rather than on an assessment of individual sentences. Thus, when we judge the truth of the sentence this should not be seen as an isolated incident but an indication and reflection of our whole web of

understanding and language. Language is not an individual mental experience; it arises from our social and physical context. Language also provides its own context; meaning should be understood in sentences not just as individual words.

Language should be studied like a natural science, as a system of dispositions to verbal behaviour, and the temptation to "surface listlessly to the Sargasso Sea of mentalism must be resisted" (Quine, 1975, In: Moore, 1993, p.87). Quine acknowledges that his use of the concepts of assent and dissent could give rise to charges of mentalism in his work. He refutes this by accepting that behaviourism may seem superficial but it is certainly not random; it is fixed in place, in most cases, by social convention. Social convention, in Quine's philosophy, can also be understood as dispositions to behaviour and actual behaviour. His long-term view for the philosophy of language is that it should study the physiological aspects of these dispositions to behaviour. His claims about behavioural dispositions can be seen as a hypothesis about unexplained neural mechanisms, which hopefully will become open to explanation in the future. In returning to his three possible levels of explanation he argues that, at present, we should concern ourselves with the behavioural level. It may not offer causal explanations but it is less likely than the mentalist level to foster the illusion of explanation. He argues that it is dispositions to behaviour that have the potential to explain the relationship between the behavioural level of meaning and the deepest level, which is physiological. Dispositions should be understood as "a physical trait, a configuration or mechanism" (Quine, 1975, In: Moore, 1993, p.89). The brain has the potential for dispositions in the same way that water is soluble. Instead of arguing that mentalistic semantics should be replaced by behaviourism he suggests that it is better to understand the mind as the same thing as dispositions to behaviour. Thus we should learn to see the mind in a different way and this would result in a better understanding of meaning. Behaviourism should be seen as an equivalent or a re-naming of mentalism rather than as a replacement.

Thus, for Quine, objectivity in language is possible because meaning can be understood on a behavioural level, and behaviour is open to public view and easy to observe. Objectivity is possible in meaning but it still has the tendency to be indeterminate and

vague. His critique of the concept of 'sense' is partly levelled at its claims to determine meaning. There are no facts about meaning apart from behaviour and it is possible to interpret behaviour in different ways. If there can be no appeal to sense to offer determinacy, then we must learn to accept an inevitable indeterminacy in our language. We have different and changing viewpoints on the world and this will effect how we interpret behaviour and thus meaning. This approach is problematic in that it raises the question of how meaning can really work if behaviour is open to potentially endless interpretation. As discussed in the introduction, meaning implies some method of establishing whether or not a word does mean a particular thing. Objectivity, in most cases, would imply the ability to settle the facts of the matter yet Quine is, paradoxically, claiming that there are no such facts. This leaves us with a picture of meaning which is, in one way, open to view as it can be seen in publicly observable behaviour but, in another way, is still hidden because of the existence of vagueness and ambiguity. His acceptance that behaviour is open to interpretation also raises the question of what lies beneath behaviour that can be open to different interpretations. It is hard not to posit some other level of understanding that may bear some resemblance to sense. Social convention is also just defined on the behavioural level and it is not clear how a collection of individual dispositions can really explain much more than the dispositions of one individual. His view on the nature of dispositions is also not entirely clear and there is no convincing evidence that it is better to see the mind as a physical mechanism. Indeed this perspective on human cognition has certainly produced many of its own philosophical confusions. The relationship between the human brain and dispositions is more complex than the relationship between a substance and its capacity to dissolve in water. His argument also identifies the three levels of explanation in meaning and then also claims they can all in fact be reduced to physiological processes. This process of reduction, however, is really as mysterious as the mental states of which he so dismissive. We do not know how consciousness is related to physiological processes. To assume that this can be explained by a physical explanation is just a thesis, not an evidence based assertion.

Despite some of these difficulties in Quine's arguments, he does make an interesting case against the concept of sense and he does widen the view of language away from the

narrow perspective of the truth or falsity of individual sentences to a complex holistic system which includes our general way of behaving. This is an important shift as it takes meaning away from the more logical tradition of Frege which tended to see sentences and their meaning as individual units. His arguments on indeterminacy also raise some interesting questions, particularly for information retrieval (IR), which is concerned with representing the meaning, and it is normally one meaning, of texts. Of particular relevance to IR is his work on translation of texts into different languages, in which he argues that meaning is something that must be retained through translation. Quine observes that we can accept that there can be different translations of one text without having to claim that only one version is correct. Thus if a document representation is seen as some kind of translation of a document then it is valid to assume that numerous versions may be effective at carrying the meaning in different ways. Putnam (1973) also argues for an essentially objective based view of meaning, a perspective which denies the relevance of a Fregean sense or any kind of mental experience in understanding meaning. In his view there is nothing that we grasp when we understand the name that can also determine its reference. An individual psychological state could not perform this purpose as it varies between individuals. Frege, as the previous discussion shows, would agree with this as he specifically claims that senses cannot be understood as subjective psychological experiences. Putnam puts forward a socio-linguistic thesis in which he claims that meaning must be a socially co-operative enterprise. He argues that we have a linguistic division of labour in the same way that other tasks are divided up and shared within society. He uses the example of our knowledge of gold to illustrate his argument. We all have to acquire the word 'gold' but we do not all have to acquire the method of recognising whether something is gold. This can be left to the experts, as long as a society has some members who are able to empirically determine whether a substance is gold, it is not necessary that everyone can. This knowledge must be held by society but it does not need to be held by every single member of that society.

The extension of a term is not fixed by a concept that the individual speaker has in his head. Extension is determined socially and it is determined indexically, which means that it is fixed by our social context and by reference and comparison to the external world.

The most important elements of meaning are external to our mental experience, one is our social context and the other is the physical world. These are closely connected because it is our social context that allows knowledge of the relationship between meaning and the external world to be managed. The exact nature of the relationship of meaning to the actual world does not necessarily have to be known by every speaker because we have a social structure that allows us to co-operatively hold this knowledge. Putnam uses the analogy of tools to explain his theory. He argues that there two sorts of tools: tools like a hammer or screwdriver which can be used by a single person, and tools like a steamship which require the co-operative activity of a group (Putnam, 1973, In: Moore, 1993, p.156). Words should be seen as belonging to the co-operative type of tool rather than the single user type. A semantic theory must include the contribution of society and the contribution of the real or external world. His use of the tool analogy has an interesting parallel to Wittgenstein's comparison of language to a toolbox (Wittgenstein, 1953, 11). His distinction between single user and co-operative tools seems, however, rather arbitrary. A Wittgensteinian perspective would argue that our knowledge of how to use a hammer and a screwdriver arises from our communal life. We may use it as an individual but both the fact that we can use it and the reasons why we are using it are inextricably linked to our collective life. Thus, all tools are co-operative and so is our use of language, even if it may initially appear that we are using it as an isolated individual.

Putnam uses his twin earth argument to demonstrate that part of our concept of meaning includes the fact that it must derive from the actual nature of things in the world. On twin earth there is a substance which looks and behaves like water but is not, in fact, H_2O. For many years we are unaware of this because we do not have the scientific ability to ascertain the chemical difference. During this time a person on earth and a person on twin earth would be in the same psychological state when they used the term water (they would share an intension) but the extension of the word would be different. In one case it refers to H_2O, in another it refers to the twin earth substance. When this is discovered we would expect to stop calling the substance on twin earth water. This demonstrates that we expect meaning to be normative. In order for us to call something water, i.e. H_2O, it must

in fact be H_2O, but whether we can know this or not is a question of our current level of empirical expertise.

The focus of this theory of meaning is a shift away from any individual experience of understanding and towards the importance of our social context and ability to ascertain the true qualities of objects in the world. Putnam's work acknowledges that meaning must be normative and thus corrects a weakness in Quine's philosophy. He also offers a very detailed critique of why mental experiences cannot provide this normative function. In his later work (Putnam, 1991) he refines his attack on what he perceives to be the continuing pervasive mentalism in theories of meaning.

> "mentalism is just the latest form taken by a more general tendency in the history of thought, the tendency to think of concepts as scientifically describable ("psychologically real") entities in the mind or brain. And it is this entire tendency that, I shall argue, is misguided." (1991, p.7)

Mentalists are striving to find an innate stock of semantic representations in terms of which all our concepts can be explicitly defined. Thus there is something in our brain which is somehow represented by what we mean in language. This can, for example, be seen in the work of Chomsky (1957), whose work focuses on discovering an innate universal grammar or map of semantic representations existing in our brains. Thus meaning is something that we are born with, and learning a language is a question of filling in the detail of a pre-existing structure.

Putnam has three main arguments to counteract this perspective on language. Firstly he argues, in a similar way to Quine, that language is holistic and that it must be understood in a wider context. He claims that holism should be understood as reaction to the logical positivist's assertion that the meaning of a sentence should be given by a rule that determines in exactly which experiential situation the sentence is assertable. Within logical positivism the aim was to reduce language down to basic primitive units which could then unambiguously be shown to be the case or not. Putnam, in contrast, argues

that meaning is not tested sentence by sentence; rather it is tested against our shared human experience. A definition of a term cannot absolutely capture the meaning of a term because meaning also exists in the world knowledge and context in which any sentence is situated. Thus a postulated mental event cannot explain how meaning works because meaning must be about a lot more than such events, even if one accepts that they do exist.

Secondly, in his view, meaning is in part a normative process and, in some cases, interpreting the meaning of a term can be very difficult. Interpretative practice requires our general intelligence and social systems of ascertaining belief and knowledge. It cannot just rely on an individual sifting through different possible meanings in their head. Finally, he claims that our concepts depend on our existing physical and social environment in a way that evolution, which according to Putnam, was completed for our brains 30,000 years ago, could not possibly have anticipated. It seems reasonable to interpret this final argument as meaning that it is very unlikely that we are born with an innate concept of, for example, a mobile telephone or a space rocket. This is almost certainly correct but this just raises the questions of how general or abstract these representations would need to be and also to what extent they are completely innate or dependent on our assimilation of experiences. It is also the case that although evolution may be slow it certainly does not stop.

For Putnam, then, meaning cannot be understood as a mental experience because it is a complex holistic process. It is dependent on both our social context and the external world. He then proceeds to dismantle in more detail the theory of meaning as mental representation. This, in part, can be understood as an attack on computational psychology or the more enthusiastic researchers in artificial intelligence (AI). Putnam begins by arguing against the idea that we have some kind of *lingua mentis* or inner language that is then translated into an externally available language. He calls this the cryptographer model in which understanding language use is seen as de-coding terms into a more basic mental language. This theory postulates that at a deeper level there is some kind of identity between sign and meaning, i.e. each sign has one and only one meaning. Two words in different languages, which have the same meaning, can be seen as two different

codes for the same item or concept in the *lingua mentis*. The difficulty with this view is that representations do not and cannot intrinsically refer to that to which they refer. The relationship between a representation is contingent and can change over time as our social and physical environment changes. The postulation of a *lingua mentis* still leaves us with the gap between the representation and the referent; it cannot be used as a device to fix meaning. It is not at all clear how one could judge whether two people were having the same mental representation and thus this cannot be used to explain meaning. A concept of identical mental representations, for example, could not be used as a device for explaining how a French person saying '*arbe*' and an English person saying 'tree' actually mean the same thing.

> "The idea that what synonymy *is* is being associated with the same mental representation is dependent on the assumption that we have a notion of *identity of mental representation* independent of the notion of synonymy." (Putnam, 1991, p.39)

It cannot actually explain anything because we don't really know that much about mental representations. This seems to relate to Quine's argument that the level of the mental in meaning can offer no possibility of explanation. Quine, however, goes on to argue that if the mental is understood to be a physiological state then an explanation could become possible as we learn more about the brain.

Finally, Putnam relates the problem of meaning to the problems of truth and knowledge by examining the question of whether there are such things as reference and truth. In his view truth operates in a similar way to meaning in that it is not just a property of an individual mental state; part of its function is to be independent of the perception of individuals, i.e. we can believe something is true and be shown to be mistaken. Truth is a product of our external world because facts do exist. At the same time, however, to say something is true is also to participate in our social normative behaviour about what counts as true. Truth and rational acceptability are interdependent notions but this does not mean that truth can be reduced to rational acceptability. Truth, like meaning, must be seen in a holistic manner. If we wish to understand how truth works we have to look at

how things come to be accepted as true in our society and the general nature of our patterns of belief justification.

Putnam then uses Godel's (1931) theory of completeness by arguing that a theory of reference assumes that there is a single system that contains all the objects that anyone could refer to. In fact this is not the case as there is no such totality of 'all the objects that are'. The belief that such a system could exist is an ontological fallacy. The term 'objects' has many and varied uses; it cannot be used to describe the contents of one complete system. In a very restricted context, such as in a specialised natural language processor, it may be possible to build such a system but it can never be valid for language as a whole. He concludes by arguing that attempts to survey meaning or reference fail for the same reason that the attempt to survey reason fails: meaning, like reason, can transcend whatever it surveys. It may, however, not be the case that meaning and reason can be so compared. One part of the problem with meaning is that it both can and cannot transcend what it surveys. It can in the sense that it is to some extent abstracted from our world, but it cannot because, at the same time, it is also limited by the world and the people who use language. Wittgenstein's argument in the *Tractatus* (1922) is that essentially one cannot transcend meaning because it is not possible to stand outside language or logic. He argues that:

"The limits of my language mean the limits of my world
Logic fills the world: the limits of the world are also its limits.
We cannot therefore say in logic: This and this there is in the world, that there is not.
For that would presuppose that we exclude certain possibilities, and this cannot be the case
since otherwise logic must get outside the limits of the world; that is, if it could consider
these limits from the other side also." (Wittgenstein, 1922, 5.6-5.61)

At the same time the *Tractatus* is, in some ways, an attempt to carry out exactly such a transcendent survey of language. It could be argued that any work in meaning is caught within this tension; an investigation of meaning tends to lead one to try and develop general theories whilst at the same time, the more about meaning that is understood, the less appropriate these theories often seem to be.

Putnam's work is a sustained and detailed critique of mentalism or the view that meaning is dependent on subjective psychological experiences. He argues that it ignores the role that both social context and the external environment (including our developing understanding and knowledge of this environment) play in how meaning operates. More devastatingly, he shows that the whole idea that a mental representation can somehow fix meaning ignores the fact that a mental representation is still just a representation; it has no extra explanatory power. Finally he relates the question of developing a theory of meaning to the impossibility of completely explaining the system of meaning. In his view, meaning by its nature transcends efforts to describe or survey it.

> "It is not possible to give a reductive theory of reference in terms of something that is more metaphysically basic, it is only possible to give a working characterisation of how it operates. Reference is socially fixed and not determined by conditions or objects in individual brains/minds." (Putnam, 1991, p.25)

His arguments are powerful and convincing in many ways. He acknowledges the normative aspect of language and provides a detailed account of how this may operate. It avoids the inevitable scepticism inherent in Quine's theory as Putnam is arguing that, when it comes to giving an object its correct name, it is possible and indeed essential to be able to establish the facts of the matter. Many of his arguments, do however, seem to strongly echo those of Wittgenstein. Wittgenstein also stresses the normative aspects of language, emphasises the importance of social convention over the individual experience, and concludes that a transcendent theory of meaning is impossible to develop whilst also acknowledging the seductive power of such a project. His philosophy of language will be the final subject of the chapter and this area will be examined more fully. The next section will discuss in more detail the role of subjectivity in meaning: is there any possible defence to Putnam and Quine's critique of its role?

2.1.3 Subjectivity in meaning

If Frege supplied the clear distinction between sense (what meaning refers to in the head) and reference (what meaning refers to in the external world) then the discussion so far has

been to critique the whole notion of the former and to expand on the possibilities of the latter. For Quine this involves the development of holism with an inherent scepticism about our actual knowledge of the external world. Interestingly, and perhaps surprisingly, this is combined with a strong confidence that the working of the brain will become open to scientific understanding. Putnam argues that we can discover facts about the external world and that the shared nature of this discovery and our social context is crucial to language. Thus the role of the external in language includes not just things but also other people. The very fact that we manage to collect knowledge about the external world is a product of our communal life.

In Frege's defence it should be remembered that he specifically did not claim that sense was an intrinsically private psychological notion. He, too, argues for a shared and communicated body of knowledge and ideas, which are vital to meaning. Thus it is not clear that too much new about meaning has really been said. There have been developments in so far as Quine and Putnam have gone into more depth about the nature of this social context, and Putnam's observations on the limitations of theorising in language have revealed the essentially problematic nature of developing a theory of meaning. The debate has also started to shift away from a discussion about how meaning could derive from reference and towards a debate about how meaning operates within our lives. It is no longer a question of simply identifying the reference object which could provide semantics to words but also a question of surveying the wider context in which this process may occur. The problem of the relationship between all these factors, however, still remains. In particular there is still the difficulty of the nature of the divide between the subjective and the objective. This section will examine philosophy that explores the nature of the internal or subjective aspects of meaning. Is it really possible just to jettison the mental from our understanding of meaning or does it deserve a more detailed analysis and place?

Searle (1984) ties his work on meaning very closely to the mind/body problem. This is an ancient problem in philosophy which can be summarised as the difficulty in accounting for the fact that we appear to be physical beings but, at the same time, we clearly have a

mental life of thoughts, feelings and intentions. It also appears that these two very different things, the mental and the physical, have a close and causal relationship. We can intend to lift our leg, for example, and this intention is somehow translated into the physical act of lifting our leg. Searle argues against the materialistic conception of the mind, which in his view denies the reality of our subjective, conscious mental states. It is not possible to claim the mind is just a physical object because it has many qualities that we do not associate with physical objects. In his view, all mental phenomena are caused by processes going on in the brain (Searle, 1984, p.22). Thus the mind cannot be reduced to the brain: it is more than just a physical object; rather the mind is a feature of the brain. Brains cause minds and minds are just features of the brain. The mind cannot be reduced to the brain but it is also not different from the brain, a position that would initially appear contradictory. He defends its cohesion by evoking the distinction in physics that is often made between the micro and macro properties of systems. On a macro-level water is liquid and this is explained by our understanding of the micro-level: the interactions between the H_2O molecules. The liquidity and the molecules are all part of the same system but there are two different perspectives of analysis of that system. An understanding of these two levels can provide a good model for understanding the relationship between the mind and the brain.

> "In the case of liquidity, solidity, and transparency, we have no difficulty at all in supposing that the surface features are *caused by* the behaviour of elements at the micro-level and at the same time we accept that the surface phenomena *just are* features of the very systems in question. I think the clearest way of stating this point is to say that the surface feature is both *caused by* the behaviour of micro-elements and at the same time is *realised in* the system that is made up of the micro-elements." (Searle, 1984, p.21)

He anticipates the objection that liquidity, solidity, etc., are identical with features of the microstructure. Solidity, for example, could be defined as the lattice structure of the molecular arrangement. In Searle's view, it is characteristic of scientific progress that expressions which are initially defined in terms of their surface features eventually become defined in terms of the micro-structures that cause those features. We need this micro/macro distinction for a physical system and we also need it for the brain. On a

macro-level one can say that something is liquid but it is not possible to pick out one atom or particle and claim it is liquid. In the same way we can say this brain is conscious but we can't pick out a particular neuron and say it is conscious. Thus although we may not yet have found out how the brain works we do already have a model for how we might understand how it works: it is an empirical problem which can be progressed through discovery rather than a metaphysical conundrum which can never be resolved.

Searle concludes his lecture on the mind/body problem by claiming that the existence of subjectivity is an objective fact of biology. We do have subjective experiences and the best way to understand them is to see them as features of our physical selves. It is an argument against mind/body dualism, the view that minds need not be biological. For Searle, the mind is necessarily biological: it is not "an irrelevant fact about the mind that it happens to be realised in human brains." (Searle, 1984, p.40)

Searle's argument at this stage has some interesting parallels with Quine's views that the mental will one day be able to be explained as an aspect of the physical processes of the brain. Searle's analogy with water relies upon the assumption that the relationship between the brain and its postulated mental properties will be in some ways similar to the relationship between water and its properties. It is hard to argue, however, that this viewpoint is anything more than speculation. Indeed if it was correct, the relationship between consciousness and the brain would actually be quite straightforward and it appears probable that an explanation of it would already exist in science. The distinction between explaining the mental through reference to the physical, whilst not reducing or equating the mental with the physical, may be a hard one to maintain. Quine, for example, offers a similar argument apart from his final conclusion that does equate the mental with the physical. Searle's example of water, which is quite clearly a physical entity, does not really illuminate the nature of the distinction. If we knew the ways in which the relationship between water and its properties and the brain and the mind were both similar and different then we would already have solved the mind/body problem.

The targets of Searle's arguments in his second lecture, *Can computers think?* are the proponents of strong artificial intelligence (AI) and cognitive psychology. He characterises their position as the view that thinking is processing information and that information processing is symbol manipulation. Computers process symbols so they can be said to think and we can learn about human thinking by studying the workings of computers. Before proceeding with this argument and their relationship to meaning it is useful to refer to Turing's (1950) original paper on *Computing Machinery and Intelligence* and relate it to Searle's arguments. In his paper Turing imagines two interrogation games. The first one involves a man and a woman in one room and an interrogator in another room. The interrogator, on the basis of written replies to his question has to decide which one is a man and which one is a woman, despite the efforts of the two people to confuse him by claims and counter-claims about their gender. The second interrogation game involves a computer and man in a similar set up and the interrogator has to guess which one is human. The exegesis by Hodges (1983, p.415) alerts us to the key argument in this paper. Gender is irreducibly physical or biological. If the woman successfully convinces the interrogator that she is the man this does not in any way change the fact that she is a woman. She has simply duped the interrogator. In contrast, Turing is arguing, thinking is not essentially biological; it can take place in any medium. Thus if a machine can convince a person that it is thinking then it is valid to say that it is, indeed, able to think. The paper assumes that the imitation principle is a valid criterion for judging thinking. Turing argued that there was no way of knowing if other people were thinking or conscious apart from comparison with oneself, so it reasonable to use the same criterion for judging whether computers can think. This is the traditional cognitivist position: thinking is symbol manipulation and the medium in which the manipulation takes place is irrelevant.

The Turing Test really assumes this position rather than offering any evidence that it is correct. The idea that we somehow infer that other people are thinking has been rigorously critiqued by Wittgenstein (1953). He argues that it is just part of our fabric of life that we assume other people are conscious; we don't sit down and work out the evidence for and against this assertion. This would somehow imply that every time we

meet a person we spend a few moments wondering if they are conscious or not and that in the future we may do the same thing every time we see a computer. The Turing Test also appears weakened by the passage of time. We have now had more than fifty years of computer development since Turing's paper yet a computer that can convincingly imitate human thinking, even if one accepted that this would prove anything, is still a fairly remote prospect. It is also interesting to note that his comparison with gender may have in some ways also been weakened by time. Gender on one level clearly is a physical fact yet feminist theory reveals that our interpretation of this fact is shaped by many factors beyond biology. Indeed, before he even wrote his paper Simone de Beauvoir (1949, vol.2, pt.1, chap 1, Trans. Parshley, 1988) had argued that "one is not born, but rather becomes, a woman."

Turing is arguing that thinking should be taken to mean an activity that could pass for human thinking and that this could, in principle, take place in a computational medium even if it is not clear that this will ever be possible to implement in practice. This could either be because the principle of computational thinking is flawed or it could be due to our current lack of computational power. Turing and the more recent AI theorists generally argue for the latter explanation, Searle is making a case for the former. In his paper Turing is presenting an experiment and asking us to mentally test how we would interpret it; thus it is really a test of how his idea fits in with our view of what thinking is. Thus, it is not really an argument or a test; rather it is a story and we are asked to consider what it may tell us. Searle uses a similar device but he uses it to argue the opposite position. This device is commonly know as the Chinese room argument but Searle actually calls it a parable (Searle, 1984, p.33), which is a very interesting distinction. A parable would normally be understood to be a story with a message or a story with something to reveal. Searle argues that its purpose is to remind us of something that we already know. It also has parallels with the Wittgensteinian methodology of testing our philosophical ideas against our ordinary use of language. This is the process of examining whether a philosophical idea actually makes any sense when we hold it against our normal behaviour. In terms of complete scepticism, for example, most people do not

check every day that their front step exists before they step out of the door. Thus this kind of scepticism does not actually have any meaningful significance in our lives.

The distinction, which Searle aims to reveal in his parable, is the one between syntax and semantics. Syntax is the formal procedures or rules of language; computers operate at this level. Semantics is what these symbols stand for and can be understood as their content or what they are about. Symbols by themselves have no meaning because they have no semantic content. Thus a computer can check through its interpreter that its code is syntactically valid but it cannot know what the code means or refers to. The Chinese room analogy involves an English speaking man in a room with a rulebook in English for the manipulation of Chinese symbols. Symbols are passed to him; he manipulates them using the rulebook and then passes them out. Thus, it might appear to an observer that the man in the room understands Chinese but he does not. He is merely using rules to manipulate symbols. He is running the program for manipulating Chinese symbols but this cannot be equated with an actual understanding of Chinese. In contrast to Turing, Searle is arguing that even if the rule following procedures might convince an observer that understanding is occurring, it is in fact not occurring. When the observer found out that the man was using a book, he would realise that he had not, in fact, been dealing with someone who could understand Chinese. He would not be convinced that it is no longer necessary to learn foreign languages because understanding them is just a question of getting a good rulebook. Understanding is something more than simply the ability to convince somebody else that you do have understanding. If understanding is not just following syntactic rules, then this raises the question of what it could be instead.

For Searle understanding and thinking are intrinsically biological processes, as much so as "growth, the secretions of the bile, and digestion" (Searle, 1984, p.41). Understanding must also be about something, which means that it must have semantic content. Both these qualities cannot be captured in a system that just uses the rule following procedures of syntax. The arguments that Searle uses are an attempt to show us that our ordinary way of understanding thinking and meaning should make it clear that these qualities cannot be captured in a purely syntactic system. He is showing us, through a parable, which is a

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very different thing from an experiment or indeed a philosophical argument, that when we examine our view of thinking it should be apparent that only humans (or perhaps some animals) can have subjective thoughts. This quality of subjectivity is vital to our understanding and to our language use: it is necessary for meaning to exist. There is a methodological difficulty here in that Turing uses a very similar kind of mind experiment to argue the opposite case. Thus it would appear that people are able to draw very different conclusions when they imagine situations in which a computational process (either an actual computer in Turing's case or the symbol sorting man in Searle's case) successfully managed to convince someone that it is thinking. In the Bible parables are used to provide pictures that were normally counter-cultural to their audience: they were supposed to reveal a new way of looking at situations. It is not clear that either Turing or Searle have managed to achieve this: in both cases they present a picture which reveals their way of thinking about an issue but the question of whether these pictures convince is open to question.

The philosophical review of meaning at this stage includes the initial distinction by Aristotle and then Frege between the internal (subjective) and external (objective) aspects of meaning. The arguments against subjectivity in favour of the objective aspects of meaning were then discussed; this position emphasises the role of the public objective world in meaning. Finally the importance of subjectivity has been discussed with the argument that meaning must include the human processes of understanding in order to count as meaning. The wider issue of what theorising about meaning should actually consist of has also been raised by Putnam and different possible levels of explanation of meaning have been described by Quine and Searle.

2.2 Meaning as a social practice

The previous discussion on meaning can be broadly understood as a search for what meaning is pointing or referring to in order to have meaning. The aim is to discover the content or semantics of meaning as distinct from just the syntax or the symbol and to explain how this relationship operates. There is much disagreement about the extent to which this is a process concerning our inner mental state or one that is more concerned

with our social context and relationship with the external world. In general, however, it is agreed that philosophy of meaning should work to develop a theory about the link between syntax and semantics. Thus philosophical work on meaning becomes an investigation into the relationship between meaning and a postulated source of semantics with the ambition of developing some kind of theoretical structure to explain this process. There is disagreement about the nature of what may provide semantics and in particular whether it should emphasise the subjective or objective aspects of meaning, but the overall landscape of the philosophical project is similar. Throughout we see the problem of trying to explain one level of meaning, the words we use, by its relationship to another level, semantics, which may be either a mental experience or physical object

This section examines the work of Wittgenstein, a philosopher who developed a new approach to meaning. His work changes the context of the subjectivity/objectivity debate and provides a different perspective of what a philosophical investigation into meaning should legitimately consist. It is both a new methodology and a new philosophy of meaning. Firstly, his arguments about the impossibility of developing an explanatory theory of meaning will be discussed. This argument is in part a rejection of the thesis that meaning has some kind of hidden level that can have any kind of explanatory power. Secondly, the different facets of his description of meaning will be analysed, and finally the implications of this for the subjective/objective divide in the philosophy of language will be considered.

2.2.1 Theories of meaning

In his earlier work in the *Tractatus Logicus Philosophicas* (1922), Wittgenstein worked on developing a theory of meaning based on devising a perfect logical language in which all the imperfections of natural language, such as ambiguity and synonymy, would be eradicated. His concern was that the imprecise nature of natural language meant that we were often unclear what a word actually referred to. The insufficiently determined relationship between a symbol and what it signified meant that there was room for confusion:

"In the language of everyday life it very often happens that the same word signifies in two different ways - and therefore belongs to two different symbols - or that two words, which signify in different ways, are apparently applied in the same way in the proposition." (Wittgenstein, 1922, 3.323)

Wittgenstein argues that these problems cause "fundamental confusions" (Wittgenstein, 1922, 3.324). If we are unclear what our words refer to then we can easily use words that actually refer to nothing or we can use words in a way that obscures our arguments. He proposes a new kind of symbolic language that would avoid this:

"In order to avoid these errors, we must employ a symbolism which excludes them, by not applying the same signs in different symbols and by not applying signs in the same way which signify in different ways. A symbolism, that it is to say, which obeys the rules of *logical* grammar - of logical syntax." (Wittgenstein, 1922, 3.325)

The recurrent fear seems to be the danger that one could be talking about nothing; philosophy's role is to guard against this.

"The right method of philosophy would be this. To say nothing except what can be said, i.e., the propositions of natural science, i.e., something that has nothing to do with philosophy: and then always, when someone else wished to say something metaphysical, to demonstrate to him that he had given no meaning to certain signs in his propositions." (Wittgenstein, 1922, 6.53)

He concludes with "whereof one cannot speak, thereof one must be silent" (Wittgenstein, 1922, 7). Metaphysics is actually about nothing; it is just symbols without reference. In the *Tractatus* there is both the ambition to develop a theoretical structure for language and a sense that this could be metaphysical posturing. There are hints that this may not be an appropriate or achievable project. In his later work Wittgenstein (1953) concluded that ambitions to develop comprehensive theories of meaning were one of the major causes of our failure to understand meaning. The attempt to look inside language in the belief that it contains a hidden essence blinds us to the actual practice of language. We have a

tendency to believe that it is necessary to analyse our expressions to find their hidden and more exact meaning. This search for a deeper essence is misguided:

> "This finds expression in questions as to the *essence* of language, of propositions, of thought. - For if we too in these investigations are trying to understand the essence of language - its function, its structure, - yet this is not what those questions have in view. For they see in the essence, not something that lies open to view and that becomes surveyable by a rearrangement, but something that lies *beneath* the surface. Something that lies within, which we see when we look *into* the thing, and which an analysis digs out." (Wittgenstein, 1953, 92)

The argument that an understanding of language is not a search for hidden depths or scientific explanatory theories based on empirical data is stressed repeatedly in *Philosophical Investigations*. Explanation, in terms of evoking something hidden to immediate view to explain what is in immediate view, is a fundamentally inappropriate methodology in the study of meaning. Wittgenstein is suggesting that we probably actually do already understand language but we have failed to recognise it. In order to recognise how language works we have to un-learn our mistaken perspectives and review what we already know.

> "The problems are solved, not by giving new information, but by arranging what we already know. Philosophy is a battle against the bewitchment of our intelligence by means of language." (Wittgenstein, 1953, 109)

Wittgenstein's argument that language can only be accurately described, rather than completely explained, can be interpreted as an attempt to jettison some of the levels of meaning in language which previous philosophers have attempted to articulate and explain. If you believe there are many levels of meaning then you have to explain the relationship between them. Wittgenstein is suggesting that the difference between a word and its meaning may not be what we tend to assume it is. A word and its meaning are both part of an expression of its use; there is nothing really over and above that. Meaning

and use are so closely interwoven into the context of our lives that it can cause confusion to try and tease out the distinctions.

> "You say: the point isn't the word, but its meaning, and you think of the meaning as a thing of the same kind of the word, though also different from the word. Here the word, there the meaning. The money, and the cow that you can buy with it. (But contrast: money, and its use.)" (Wittgenstein, 1953, 120)

The meaning of money is in one sense the actual coin or note but it only really has meaning or value in the social system which legitimises and supports its value. Money that could never be used would be worthless.

2.2.2   Language games

If understanding meaning is not a question of developing a theory of how words can be accurately connected to their meaning then what kind of philosophy of meaning is Wittgenstein proposing? Firstly he is not trying to construct a system but rather to uncover the confusions that prevent us seeing what we do, in fact, already understand about our language use. He argues that if we can learn to accurately describe the myriad of different ways in which we use language then we will start to regain our instinctive understanding of language. Thus the first and one of the most important, things to establish about language use is its variety. It cannot be contained within one limited theory. One of the ways in which he explains the nature of this variety is through the concept of language games. A language game is both the use of language in a particular situation such as arguing, praying, naming, etc., and the wider context in which language takes place. Language is not just naming, rather it is a complex set of different activities. It can be understood as a toolbox with many different possible uses.

> "Here the term "language-*game*" is meant to bring into prominence the fact that the *speaking* of language is a part of an activity, or of a form of life.
> Review the multiplicity of language games in the following examples, and in others:
> Giving orders, and obeying them-
> Describing the appearance of an object, or giving its measurements-
> Constructing an object from a description (a drawing)-

Reporting an event-

Speculating about an event-

Forming and testing an hypothesis-

Presenting the results of an experiment in tables and diagrams-

Play-acting-

Singing catches-

Guessing riddles-

Making a joke; telling it-

Solving a problem in practical arithmetic-

Translating from one language to another-

Asking, thanking, cursing, greeting, praying.

-It is interesting to compare the multiplicity of the tools in language and of the ways they are used, the multiplicity of kinds of word and sentence, with what logicians have said about the structure of language. (Including the author of the *Tractatus Logico-Philosophicus*.)" (Wittgenstein , 1953, 23)

When we keep the "multiplicity of language games in view" (Wittgenstein, 1953, 24) we are less likely to search for an essence of language. Wittgenstein is shifting the focus in philosophy of language from the problem of naming, the link between words and objects, to a view of language that sees it as part of a varied number of different activities. If we want to understand language we have to try and understand the context in which language takes place. This is the meaning of his assertion that language is a "form of life" (Wittgenstein, 1953, 23). He also claims that language can be understood as part of our biology in that "Commanding, questioning, recounting, chatting, are as much a part of our natural history as walking, eating, drinking and playing" (Wittgenstein, 1953, 25). This appears similar to Searle's arguments about the biology of the brain although Searle only concentrates on the biology of the individual.

2.2.3   Rules and meaning

Language then, should be understood as an intrinsic part of whole physical and social lives rather than as a kind of abstract haze floating over it. This still leaves the question of how the relationship between meaning and our form of life actually operates. They cannot actually be identical. There must be both a close connection and some form of

separation for language to exist. Wittgenstein argues that in order for meaning to work there must be some system of knowing what a word means and some way of knowing that it is being applied or used consistently. There has to be some kind of check or external test of our inner view that we know what a word means. Meaning is normative, an individual must use words in the same way over time, and a social group must have some level of shared agreement about what words mean. If the meaning of a word could change at random then it would, in effect, have no meaning. Language use requires rules and Wittgenstein's analysis shows how these rules operate in away which allows words to be used consistently and collectively. The question of how universal these shared rules are is an interesting one. Wittgenstein tends to emphasise the similarity between human beings whilst emphasising the differences between the different ways in which we use language, and this can present a tension within his philosophy. There are differences between how some particular social or professional groups use language but these differences perhaps only appear important because they are, in fact, relatively minor compared to the great mass of shared usage.

If rules are going to work in meaning then it is important that following them is not a question of interpretation. This leads to the sceptical position in which it is never possible to know meaning as different interpretations could always be given. This is one of the problems with Quine's philosophy of language. In contrast Wittgenstein argues that when we follow rules in language, we do not think of the rule, wait a moment to interpret it and then follow it. Obeying a rule is not a matter of interpretation.

> "And hence 'obeying a rule' is a practice. And to *think* one is obeying a rule is not to obey a rule. Hence it is not possible to obey a rule 'privately': otherwise thinking one was obeying a rule would be the same thing as obeying it." (Wittgenstein, 1953, 202)

It is not possible for a rule to be followed only once it should be understood as following a custom which can be seen as a form of use or institution (Wittgenstein, 1953, 199). The issue in meaning which needs to be correctly understood is the problem of carrying on as before. Why is every meaning use not an interpretation? Custom and practice means that

there is no 'gap' between an order or description of a rule and carrying it out. We don't deduce what a rule means, we just do it. We don't deduce that other people are conscious, we just live as if they are.

Wittgenstein's arguments seem to emphasise the external aspects of meaning rather than the inner mental state of the language user. If meaning must be normative then it requires techniques for checking if the rules are being followed correctly and an individual's inner experience of language is not able to perform this function. This emphasis on the external is, however, very different from the behaviourism advocated by Quine. Following a rule is not a question of individual interpretation but is it also not only an automatic or instinctive reflex. McDowell's (1984) exegesis of Wittgenstein emphasises the distinction between behaviour and taking part in a custom or an institution. Human practice is not just a set of behaviours, it is a complex system and an expression of humanity; in one sense our practice does express our inner lives. This is not, however, because of the relationship between what we do and a mental experience; it is because of the relationship between what we do at a particular time and how this is woven into the rest of our lives. In order to understand a practice it is necessary to understand the context and significance it has for the participants.

These arguments can be illustrated by using an example from Wittgenstein's work *Remarks on Frazer's Golden Bough* (1979) which is a critique of Frazer's anthropological research. He reveals the failure of Frazer to understand the practice of the rain-dance because Frazer persists in seeing it as an unreliable way to make the rain come; for him it is a failed technique. Wittgenstein argues that the practice of the rain-dance is not a technique to make it rain, it is an expression of the community's collective need for rain and through ritual this need is given up to a higher power. This is the point of the rain-dance, and as Wittgenstein observes, in the end it does rain anyway. Meaning cannot be understood just by looking at the external form of the rain-dance or by examining the mental state of one of the participants; it can only be understood by examining how the rain-dance fits into the whole social practice or form of life of the tribe. Thus it is through practice and custom, arguably as uniquely human as language,

that the gap between the inner and the external aspects of meaning can be resolved. The subjective/objective divide in meaning thus loses its power and importance.

If Wittgenstein is right about meaning then it tends to lead to the conclusion that much of the rest of philosophy of language is futile. His work claims that theorising about meaning can only lead us astray. Philosophical concerns about whether the inner experience or the external appearance of meaning is paramount are only reflections of a failure to understand how meaning is inextricably tied up with our form of life. Meaning is part of a complex set of customs and practice that serve to bridge the gap between our inner and social lives.

2.3 Conclusions

This review of philosophical work on meaning can be seen as a discussion of efforts to separate meaning out into different elements and then efforts to bring these elements back into some kind of relationship which can produce meaning. The approaches discussed have various views on the nature of these elements and different views on how these relationships should be explained. Firstly there is the distinction between the subjective or inner and the objective or external aspects of meaning. This can also be understood as the distinction between intension and extension. Frege argued that both of these are necessary though it is then difficult to explain their relationship. Quine and Putnam argue against the mental aspects of meaning; this means they don't have to explain the relationship but they could be ignoring an important aspect of meaning. Searle emphasises the subjective aspect of meaning and argues that in the future we will be able to explain its relationship with physical processes in the brain. Finally Wittgenstein argues that our understanding of language is hampered by this emphasis on creating separation between the individual and the objective or external aspects of meaning. Both these aspects are brought together by accurately describing how meaning operates within our whole form of life. At the same time he appears to be arguing against a unified approach to developing a theory of language; describing the myriad different ways in which language is used could be interpreted as another way of separating language out into different elements. Thus it could be argued that those who favour a unified theory of meaning have to separate

meaning out into discrete elements whilst those who argue for an accurate description of its diversity tend to see meaning as an expression of our collective shared life and the unity of the body and mind.

Philosophical work on meaning raises and explores many questions on the nature of our inner life, the nature of our social or collective life, our ability to have knowledge of the external world, and our ability to develop theoretical structures about how these issues inter-relate. Thus any philosophy of meaning must have a particular perspective on these issues which will inform how it addresses the questions of meaning. These questions are: understanding how meaning appears to be both subjective and objective; how the shared or normative aspect of meaning operates; the extent of our ability to understand these processes in a theoretical way. The next two chapters of this thesis will examine how these issues have manifested themselves in the field of information science. Can an exploration of these questions help illuminate the nature of information science?

3 The meaning of information science

Information retrieval takes place within the context of information science and here we discuss the nature of this context. This chapter analyses the meta question of the meaning of information science which provides a context to the next chapter's analysis of meaning in information science. The main question under consideration in this section is whether an understanding of meaning can lead to a better understanding of what information science is. At a general level an investigation into meaning can assist in clarifying the problem of defining information science. On a more specific level meaning in information science can be analysed to help improve our understanding of the different perspectives and concepts within information science and the dilemmas they pose for the discipline. Thus, an analysis of meaning within information science raises two central questions. What does information science mean, and what role does meaning play in its activities? This chapter focuses on the first question and the next chapter focuses on the second question. The argument is that, to quite a great extent, the issues discussed in meaning in the previous chapter are also important issues in information science. An understanding of the complexity of meaning can help illuminate why information science can be so hard to define and why working with information can be so hard to get right. The subjective/objective divide within meaning runs through information science and the efforts to solve it often bear a strong resemblance to work within the philosophy of meaning. Thus an understanding of meaning can help us understand what information is and how to find out about it. The question of how to find out about information cannot be answered without an investigation into whether information science is actually a science or not. I argue that an understanding of the role of theory in meaning, and in particular Wittgenstein's arguments about the nature of philosophical investigations, can help answer this question. His argument that most philosophical problems and conceptual confusions are caused by a failure to have a clear view on the appropriate way to approach particular subjects is important for information science. In my view information science is often not clear about how it should carry out its research and this failure is partly the cause of some of its conceptual and theoretical frustrations.

This chapter begins with a general discussion on the initial problem of defining information science. The question of definition is discussed in the context of different views within the philosophy of language about what counts as defining a term. This leads onto a discussion about whether information science can validly be called a science: is science an appropriate description or not? Secondly it analyses some of the fundamental concepts of information science, which are argued to include both the subjective/objective tension inherent to meaning and the concepts of change and knowledge. Information is understood to involve some kind of change and this change is normally connected to knowledge. The question of whether this change should primarily be understood as a change in an IS system, such as the retrieval of certain documents, or as a change in a person's knowledge state, the process of becoming informed, is an important theoretical debate in IS. The aim of this chapter is to explore the distinctive features of information science and discuss the ways in which information is related to and also different from meaning.

3.1 Defining information science

Information science is a relatively recent term that started being used in the 1950s (Meadows, 1987). After the second world war there was both an increase in the amount of technological and scientific information and a growing recognition of the importance of storing it in a way which made it easy to use. Information science was used to describe the activity of developing systems and methods of collecting, storing and disseminating this information.

The most obvious way to define information science is to examine what information means and to examine what science means. This discussion should then lead to a view on what information science means. One's views about the nature of information could also lead to conclusions on the appropriateness or otherwise of the scientific model for IS. This approach is not eschewed entirely in this particular analysis but it begins with a discussion on what is actually meant by definition. When we say, "What do we mean by information science?" what kind of question are we asking? Definitions appear to matter because they give confidence that we are all talking about the same thing but if we are not

clear what we mean by definition then this confidence may be misplaced. Within the philosophy of language we have seen the distinction between definition as reference either to an object and/or a mental state, for example in Frege's (1892) work; and definition as a description of how a word is used in the work of Wittgenstein (1953). This is part of the content/use distinction in terms of whether meaning derives from what a word is about (its content) or the way in which it is used. There is also commentary on Wittgenstein (Ishiguro, 1969) which argues that this distinction cannot be clearly maintained as both aspects rely on each other. In the conclusions to the previous chapter it was argued that much of the philosophy of meaning could be understood as efforts to separate meaning out into its constituent parts and then arguments about how these parts might be related. Thus in the content/use debate this process can be seen at work because a conceptual separation has been made by some, such as Frege, but there is also a discussion about whether it can really be maintained. This debate extends into differing interpretations of Wittgenstein, widely regarded, and certainly by those (Blair, 1990; Hjorland, 1997) who use his work in IS and IR, as an exemplar of the 'meaning is use' approach. Wittgenstein did, in fact, include some qualifications into his views on the importance of use in meaning.

> "For a *large* class of cases - though not for all - in which we employ the word "meaning" it can be defined thus: the meaning of word is its use in the language." (Wittgenstein, 1953,43)

We will now examine some definitions of information science and see if the content/use distinction is an appropriate tool and whether it can meaningfully be maintained. Borko (1968) provided one of the archetypal definitions of information science.

> "Information science is that discipline which investigates the properties and behaviours of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. It is concerned with that body of knowledge relating to the origination, collection, organisation, storage, retrieval, interpretation, transmission, transformation, and utilisation of information.

It has both a pure science component which enquires into the subject without regard to its application, and an applied science component, which develops services and products." (Borko, 1968, p.3)

Borko here seems to be emphasising the importance of both content and use: the properties of information are important but so is its usability. He also makes an explicit distinction between investigations into information *per se* and investigations about developing services and products. This distinction between content and use can also be seen in the historical differences between the US view of information science and the UK perspective (Hanson, 1971). In the UK, information science historically used to mean the manipulation and analysis of scientific and technological information in order to facilitate the work of scientists. Thus its primary meaning was information about science. The aim was to store, organise and retrieve scientific information in order to make it more accessible and therefore useful. In the US, in contrast, the term meant the application of science and technology to information generally. Thus science and technology are seen as tools, something to be used, rather than as necessarily what the information is about. The aim is to use science and technology to make information, with any kind of content, accessible for use. This latter definition is now the one in more normal use but the legacy of the primacy of scientific information is an important aspect of information science (Meadows, 1987).

Bates (1999) primarily takes the 'definition as use' approach and argues that information science needs to be understood as operating within two paradigms. A paradigm is defined as a core body of theory and methodology along with an associated world view regarding the phenomena of interest to the field. She argues that within information science there is an explicit paradigm that describes information science as the study of gathering, organising, storing and retrieving information. There is also an implicit paradigm that concerns the focus or approach of information science. Bates argues that information science is not defined by its content but by its approach to information. It cuts across content disciplines and, in fact, uses the content of other disciplines for its own activity of analysing and shaping this content in a way which facilitates the social objective of the

transmission of knowledge. Information science should be seen as meta-science because it is research and theory about the documentary products of other disciplines and activities. Its focus is on the representation and the organisation of information rather than having knowledge of the information. She uses the distinction between 'being' and 'representing' to illustrate her argument. In the same way that we accept that actors are better at portraying doctors in television programmes such as E.R. than real doctors would be, we need to acknowledge that the skills of representing information are different from the skills of knowing information. Thus information science should not be defined by its content. Indeed most, if not all, disciplines deal with information, but IS can be distinguished by its approach and perspective to that information.

This argument appears convincing in many ways but it is difficult to rigorously maintain the distinction between content and use. It is necessary to have knowledge about the content of information if you wish to represent it effectively. There is also the question of what exactly is meant by approach and perspective. Is this a way of thinking and/or a way of working and, if so, how could it be identified? It is an argument that attempts to define information science by its approach to information but it appears to leave unclear the nature of the approach, which the definition relies upon. The analogy with actors is interesting but acting is not really the same as representing. The goal of the actors is to provide drama rather than a realistic picture of hospital life. In fact if you did want a realistic picture you would probably install hidden cameras and this would be precisely to stop people representing hospital life and instead to enable them to reveal hospital life.

One of the difficulties in defining information science is that the use of information is so widespread that it cannot effectively be used to distinguish between different disciplines. Buckland's (1997), analysis of the nature of documents and Hjorland's (2000b) theoretical views on information science both emphasise that almost anything can be informative or count as information if it is found to be pertinent and used. Indeed Hjorland disputes the name of information science, arguing that documentation science could be considered more appropriate. He claims that the important activity is the study of informative objects, which may or may not be textual documents, and the intrinsic

nature of them is relatively irrelevant. A fossil, for example, could be understood as a document or an object in a museum. They both provide evidence that could change our understanding. It is their informative function that should be of interest rather than their physical nature. Thus, to say that information science can be effectively defined by its content seems to be inadequate, some acknowledgement of perspective and activity is necessary to distinguish it from other disciplines. Indeed Hjorland's work stresses the importance of theoretical perspective both within information science and also in the specific treatment of documents. He argues that one purpose of classification should be to make explicit the theoretical perspectives of documents. The theoretical perspective is also linked to the form of the document, i.e. its rhetorical style and its physical nature, such as length and the use and number of references (Hjorland, 1998a).

Hjorland's arguments, in a similar way to Bates's, do raise the question of what exactly is the nature of a theoretical perspective and how does the informative function of an object relate to its content. Hjorland argues that it is widespread for academic research to study the same phenomena from different perspectives. His example is the family, which can be studied in many ways, including an economic approach, a sociological approach and a psychological approach. Thus, in these terms, theoretical perspective can be understood as an emphasis on a particular aspect of a phenomenon and a search for explanation about the phenomenon through that aspect. Information science then becomes the activity, which studies phenomena from a perspective which emphasises them as information or as part of an information process and it looks for explanations from this perspective. Does this not, however, presuppose, as opposed to argue for, that an information perspective exists in the same way as the three perspectives provided in his family example? His work is analysed in more depth in the next chapter and the coherence of his theoretical research is assessed.

The divide between content and use is explicitly addressed by Capurro (1992). He argues that looking for the essence of information is inappropriate: information science should concern itself with information in action rather than search for its qualities as if it were some abstract entity.

"The question 'what is information?' asks for the substantial characteristics of something. But information, taken as a dimension of human experience is nothing substantial. Instead of asking 'what is information?' we should ask 'what is information (science) for?'. The change over to the second question means a change in perspective which takes as a starting point the cognitive turn but goes beyond it in search of a pragmatic and rhetorical perspective." (Capurro, 1992, p.3)

Information, for Capurro, is part of our social context and should be studied as such. Capurro's approach can be seen as broadly Wittgensteinian in that he is looking for the meaning of information by investigating how we use it in our shared lives. If we want to know what information is we should describe how we use it. This is still, however, very difficult. Wittgenstein also argued that an accurate description of how meaning is used must exclude any attempt to provide general theories about meaning. IS, however, is often concerned with trying to develop such theories.

Saracevic (1999) also argues against the pursuit of definitions and proposes that information science should follow the recommendations of Popper (1989) and define itself, not by its subject matter, but by its problems.

"Debates over the 'proper' definition of information science, as of any field, are fruitless and in expectations naive. Information Science, as a science and a profession, is defined by the problems it has addressed and the methods it has used for their solutions over time." (Saracevic, 1999, p.1051)

Saracevic here is arguing for a problem-based approach and the assumption that appears to underlie his proposal, in which he refers to information science "as a science", is that these problems are broadly scientific in nature. This assumption, however, is difficult to maintain. Popper and Wittgenstein famously disagreed about the nature of philosophical puzzles and problems (Popper, 1976, pp.122-125). The consequences of failing to distinguish between scientific problems, which can be solved by data, and philosophical puzzles, which can be solved or rather dissolved by re-arranging our perspective on what

we already know, are consistently warned against in Wittgenstein's work. Popper also argued that if theories could not be falsified by data then they should be discounted as mere speculation. This is discussed in more detail in section 3.3.1.

Losee (1990) also takes a more scientific approach and argues that descriptive techniques cannot lead to new insights into the nature of information. Before reviewing Losee's contribution we will return to Turing's (1950) paper on computers and thinking, which he begins with a discussion about the correct way to define the meaning of terms.

> "I propose to consider the question "can machines think?". This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect as far as possible the normal use of words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, "can machines think?" is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question with another, which is closely related to it and is expressed in relatively unambiguous terms." (Turing, 1950, p.433)

He then goes on to describe his interrogation game in which a hidden man and women try and confuse an interrogator about which is which. Turing proposes that the way to investigate the questions whether machines can think is to consider whether, if a machine replaced the man, the interrogator would find the game any more difficult. This is an interesting shift as Turing begins with arguing against looking to our ordinary use of words for meaning, but his interrogation game can be seen as a way of testing our ordinary use of words against a particular scenario. Given what we normally mean by 'think', which he takes to be an activity which could be independent of a human physical medium, it would only be fair to say a machine could think if it managed to convince us in this game. He also assumes that we infer that other people think from observing their use of words. Thus we could therefore infer that a machine is thinking too if its use of words was similar enough. Thus Turing is explicitly arguing against Wittgenstein by discounting our ordinary use of words and by adopting the Cartesian position that we

infer the consciousness of other people. Wittgenstein argued that the assumption that other people also think is just a given part of our form of life: to suggest that we somehow work it out every time we meet someone is nonsensical. Turing's investigation, however, relies on the description of how we legitimately use a particular term, 'thinking', in a game; an approach that certainly has Wittgensteinian overtones. His game is not a scientific experiment in so far as it cannot really discover anything about the essence of thinking; it is just an invitation for us to consider how we use the term. The usefulness and validity of such thought experiments is disputed within philosophy. A thought experiment cannot provide new data and it cannot also, at least not often, reveal something to be necessarily or *a priori* true. If an experiment, cannot in principle be actually carried out then a thought experiment may have a role. Turing's thought experiment, could, however now be carried out but it is not clear how it could provide a conclusion as to whether machines can think, even if the interrogator was fooled. It relies upon the assumption that the interrogator's perception is the only deciding factor in this case. Wittgenstein argues, that most of us would say that, if he was fooled, he was precisely that, i.e. mistaken.

Thus, claims that thinking can be defined as a physical process does not make it true. I argue that this difficulty can also be seen in some of the more avowedly scientific approaches to information. A rejection of examining how we use information does not necessarily lead to a convincing scientific alternative. Losee (1990) begins his book, whose title *The science of information* makes clear his views on the primacy of the scientific approach, with a criticism of philosophical approaches to information.

" In his recent book on information, Christopher Fox suggests " an investigation of the notion of information must begin, at least, with the ordinary language notion of information."(Fox, 1983). While this approach may be adequate for philosophical enquiries such as that undertaken by Fox, a science developed within the constraints provided by the ordinary usage of terms often results in little progress and few 'breakthroughs'. If commonly accepted views of the world had never been challenged, the universe might commonly be considered to be centred around a flat earth. The overthrow of these now rejected ideas which were shown to conflict with experimental data or more strongly

accepted ideas was made by moving beyond then-current definitions and concepts. This study of information will not begin by accepting the common notions concerning information." (Losee, 1990, p. vii)

Losee is arguing here that our understanding of information cannot develop if we simply remain at the level of describing how it is used. This sort of common sense approach cannot lead to knowledge. What is needed is a scientific approach to the study of information. This argument is convincing if one believes that there is enough similarity between information and the subjects that are more conventionally studied by scientists for this to be a valid comparison. The scientific approach does lead to progress in science. In the Popperian (1968) sense this is because science has the kind of theories that can be falsified by data. Within information science and information retrieval it is hard to locate one theory that has convincingly been rejected (Blair, 1990; Sparck Jones, 2000).

From this review of different perspectives on the correct method of defining information science, and viewpoints on what that definition could consist of, one can observe a broad divide between those that focus on the importance of content or subject matter in information science, and those that focus on how information is used in information science. The subjective/objective divide runs through both these approaches. The content approach can be understood as part of the reference theory of meaning and this can be either subjective or objective depending on whether one emphasises reference to an external object or a mental event. The use approach to information can broadly be understood as part of the social practice approach to meaning and thus is an attempt to subvert the subjective/objective divide by revealing how our shared social practices normally make it irrelevant. Within both these approaches runs the question of how scientific an investigation into information can be. If information science is about content then is this the kind of content that one can have falsifiable theories about? If information science is about the use of information then what kind of theories can one have about this use? There are clearly different perspectives about what information may be but how do these relate to questions about the best way to study it? The next section discusses the nature of science and its pertinence or otherwise to an investigation into information.

3.2 Information as a science

If the previous discussion can be seen as a debate on the right way to define information the discussion in this section can be seen as a debate on the right way to find out about or study information. These two questions are related: how one thinks one should investigate information will be influenced by what one thinks information is. If information science really is a science, then one's hypotheses about the nature of information might be disproved by one's investigations. This, however, never really seems to happen as has been noted, by various leading figures in both IS and IR (Blair, 1990; Hjorland, 2000a).

I argue in this section that work in the philosophy of meaning, particularly that of Wittgenstein, has an important and so far underused contribution to make to our understanding of what it could mean to investigate information and the extent to which this could be a scientific question. The difficulty in answering this question arises in part because the term 'science' is used in at least two ways: either as neutral descriptive term as in "Here is our science laboratory" or as a normative or aspirational term as in "We hope to make our next investigation more scientific than the last one". Thus when analysing the role of science in IS the distinction between these two different uses of the term is important. Science can be used in different ways and these may have different relationships to the actual content of IS activity. When discussing whether information science is a science it is also useful to note that this is not normally seen as a neutral question but one of perceived status. Searle (1984) makes some pertinent observations about the overly ubiquitous use of the term 'science' as a badge of status rather than as description of activity.

> " 'Science' has become something of an honorific term, and all sorts of disciplines that are quite unlike physics or chemistry are eager to call themselves 'science'. A good rule of thumb to keep in mind is that anything that calls itself a science probably isn't - for example, Christian science, or military science, and possibly even cognitive science or social science. The word 'science' tends to suggest a lot of researchers in white coats waving test tubes and peering at instruments. To many minds it suggests an arcane

infallibility. The rival picture I want to present is this: what we are all aiming at in intellectual disciplines is knowledge and understanding. There is only knowledge and understanding whether we have it in mathematics, literary criticism, history, physics or philosophy. Some disciplines are more systematic than others, and we might want to reserve the word 'science' for them." (Searle, 1984, p.11)

Is Searle right that that the very name 'information science' should cast serious doubts about the scientific nature of IS? My broad argument is that IS is not a science and that and an investigation using the philosophy of meaning can provide some new insights into why this is the case. So far we have identified a conflict between the relative importance of the subjective or the objective and the relative importance of content or use in analysing information. Both these issues have a strong relationship to similar issues in meaning. What do these issues have to do with the perceived difficulties in researching information and to what extent is the scientific model a possible cause or solution to the problem? Before proceeding with this discussion the central elements of scientific enquiry are outlined in the next section.

3.2.1 What is science?

This section is an analysis of the key concepts in scientific methodology. I argue, that whether or not scientific methods are pertinent to IS, it is essential to understand them correctly. Scientific language and techniques have had, and continue to play, an important role in IS and the language game of science is very influential in IS. Whether IS is at home in this language game or awkwardly out of place forms part of the basis of this discussion.

My perspective in this section is Wittgensteinain (1953) in so far as I argue that one way of understanding science is to see it as a particular language game. This means that it has particular rules and shared methods of procedure, its own grammar of accepted behaviour and its own vocabulary. A language game is a whole system and the way the elements interact is as important as the nature of those elements. These make sense and are useful within the language game of science but, as Wittgenstein argued, most philosophical puzzles arise when we inappropriately borrow language games and try to use them in the

wrong situation. This raises two questions for IS: firstly, has IS as a discipline correctly understood the language game of science; secondly, is the language game of science the correct way to view IS? In IS we often see things that look like science, such as experiments, theories and hypotheses but whether they are actually working together in a way that can produce knowledge is often less clear.

I will analyse these questions by examining the key concepts in science, which I argue are data and their relationship with theories. The view of science taken in this discussion is based on the arguments of Popper (1968). He argued that in order for an activity to qualify as science it must aim to develop knowledge using explanatory theories, which can either be supported or refuted by data. These elements must have the correct relationship; it is not enough that they are simply present, the data must disprove or prove the theories and the theories must actually explain the data. Popper argues that theories should invite refutation: a sign of a good theory is that there is a clear way in which it could be falsified.

Data in science must be objective, i.e. it must be possible to observe and the observation should not depend on the perspective of the scientist. It must also be possible to repeat the experiment at a different time and collect similar data. The data should not be contingent on a particular time, place or experimenter. In the highest levels of physics and astronomy this requirement becomes blurred but in most cases it holds as a useful criteria. The data in science is normally quantitative, it does not have any hidden meaning, and does not require an understanding of a subjective state. In Nagel's (1979) infamous essay *What is it like to be a bat?* he argues that any investigation into consciousness is characterised by an acknowledgement that is it possible to ask "what is it like to be?" of a conscious being but not, for example, of a biro pen. Scientific data does not normally concern itself with questions of "what is it like to be?". It might want to measure a bat's ability to avoid objects in the dark but it would not normally concern itself with the bat's subjective experience of its ability. Data can be collected about abilities but it is not clear how data could be collected about how they are experienced.

Scientific data needs to be reliable which means it has to be possible to measure it accurately and repeatedly and it also has to be valid which means that it has to actually tell you something about what you are trying to study. Experiments can be understood as techniques for gaining data of this sort. The purpose of data collection is to test a theory. The importance of repeatability of experiments is the accumulation of evidence that the factors in the theory that are hypothesised to cause certain effects are, in fact, the cause. Repetition allows one to discount the possibility that some other unpredicted cause was the factor.

Is there such a thing as peculiarly scientific theories, i.e. are there certain sorts of claims that only scientific theories can make? Popper's (1968) thesis of falsification offers a convincing method for distinguishing scientific theories from other statements. Popper emphasises that theories must contribute to the growth of science, which means that they must increase our power to explain the world. As such a scientific theory must be capable of being proved false. Scientific knowledge grows because it abandons theories that are disproved by data and develops new ones, which are in turn tested and replaced if data is discovered to disprove them. This means that it must in fact say something about the world (i.e. not just be analytic statement) and it must, in principle, be possible to collect data which could disprove it. The hypothesis that oxygen and water cause metals to rust, makes a clear claim about the world and can easily be tested whereas the theological statement that 'God is infinite' does not. A scientific theory should invite refutation whilst a non-scientific theory will generally avoid it.

This leads onto the concept of explanation. A scientific theory must actually explain something in the world. This means that the theory must have a certain kind of relationship to that which it explains. It must be precise and make specific claims because if they are too vague they become hard to refute. The phenomenon it purports to explain must be the kind of thing about which it is possible to make precise statements.

Theories explain by referring beyond our experience to causal connections that then make sense of the data. The connection itself is not observable but we can observe its effects.

Theories also explain by describing the hidden nature of something which then makes sense of its behaviour, for example that seemingly solid objects are actually made up of atoms (Harre, 2001). An explanation of a phenomenon must in some way look behind the phenomenon to explain its behaviour either in terms of causal connections or in terms of its hidden nature; it must go beyond the given.

In summary, a scientific theory must make a precise claim about a phenomenon in the form of a theory. It must be possible to collect data that could disprove the theory. It must also actually explain something. It must go beyond the immediate data to posit causal links or insights into the nature of the phenomena, which then enable us to see the phenomena in a way that makes sense. Science is concerned with the growth of knowledge and as such it abandons theories that do not fit with the data. It must include the development of explanatory theories and the collection of data to test whether their predictions are correct. One way of seeing this process is as a particular sort of language game of science: the rules and conventions that have to operate in order for an activity to be called a science.

3.2.2 Is information science a science?

The previous discussion has argued that in order to qualify as a science a discipline has to have both data and theories and that these have to be related in such a way that the latter can explain the former and the former could disprove the latter. Thus science has to say things about its subject matter that are valid, i.e. they do reflect its nature, and also reliable, i.e. they can be tested rigorously. It also has to move beyond the descriptive to actually explaining things, by means of revealing hidden causes, which enable it to predict how things will behave under certain conditions. So how does information science stand up under an examination using these criteria?

My thesis is that this question needs to be answered on two different levels, which relate to the different uses of the term 'science' as previously discussed. I argue that information science could only be called a science in the aspirational or normative sense. It is accurate to say that many researchers in the field want to be seen as scientific in what they do and that is how they describe their activities. It is not the case, however, that this

liberal use of the word 'science' normally refers to any content in IS about which it is possible to make scientific statements. In the Searlean sense IS could be said to have the syntax, or outward form of science, but not the semantics, or meaningful content. In the Wittgensteinian sense IS is not at home in the language game of science: it is trying to use the form of the science language game but this is a thin carapace rather than a reflection of its actual activities and context. Thus, in this discussion I will argue the following three hypotheses: firstly IS is not a science; secondly IS often claims to be a science in a number of different ways; and finally that this mismatch between claim and reality is one of the causes of the perceived theoretical frustrations of IS. In terms of the dialectical model, discussed later on in this thesis in chapters 6 and 7, often the best way to understand IS's scientific claims is to uncover how they reveal the very opposite of what they claim. The philosophy of meaning has a useful contribution to make to this analysis, both in untangling the nature of this mismatch between claim and reality, and in providing insights into why information may resist scientific analysis.

I argue that the main reason why IS is not a science is that it does not have theories that can be falsified by data. This is because what are often called theories in IS do not normally have much explanatory content because they do not posit causes and effects. Thus it is difficult to find data which can show that certain effects were or were not the result of certain causes because no such clear hypothesis has been made. Concerns in IS that experiments cannot be repeated, which may make them unreliable because there are so many different factors at play, should in fact be secondary to the fact that it is often not clear whether there actually is an hypothesis to test. If a hypothesis cannot be falsified by data then it cannot qualify as a hypothesis in the scientific sense. It may be an interesting model, or way of seeing information, but it is not science. A model that is clearly a model can be a useful analytical tool; a model that postures as a theory is normally destructive to understanding.

A scientific theory requires an explanation and this normally takes the form of posited causes and effects. The effects of this will be observable but the reasons or causes behind them have to be deduced. Some kind of theoretical structure or pattern is normally also

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provided within which these causal mechanisms are hypothesised to operate. An explanation is an account that satisfactorily answers the question of why a certain action had a certain effect. In a scientific sense this would normally be taken to mean some kind of reference to how an event fitted into scientific laws and theories (Harre, 2001). It would include reference to how the superficial aspects of phenomena, e.g. fire, can be explained by aspects of their nature which are hidden to the casual observer, in this case the way atoms behave under certain conditions. Thus for an explanation to add anything to an observation it would appear that it needs to refer to hidden aspects of phenomena and describe how they fit into a structure of patterns about how those phenomena behave. This should make it possible to accurately predict their behaviour in certain conditions.

A review of the literature on theory in IS and IR (Sparck Jones, 1981, 2000; Ellis, 1996; Blair, 1990; Blair and Kimbrough, 2002; Hjorland, 2000a, 2003b) reveals a fairly high level of consensus that there is a problem with the nature of theories but some different views on how, and indeed if, it should be addressed. I argue that the central question on this issue is whether one regards the current weakness in IS theory as a failure of method or whether one regards it as a failure to acknowledge that information may just not be the kind of thing that one can develop scientific theories about. The former could be characterised as the 'we should try harder' approach and the latter as the 'we should try something different' approach. Is information the kind of thing that one can develop scientific theories, or indeed any kind of theories, about, and how does this problem relate to meaning?

Hjorland (2000a) uses Popper's criteria for successful science as the development of falsifiable theories as a benchmark for information science, which he sometimes calls library and information science (LIS). He argues that, if it is to count as a research activity, it has to develop research problems, methodologies and models that can lead to theoretical growth in the field. If theories can't be falsified they can't increase knowledge because there is not a way of rejecting false hypotheses.

"We do not have many explicit theories in LIS. It is a well known fact that LIS lacks good theories. Brookes (1989) noted that it is important that information science should not be regarded as "a collection of practical skills without underlying theoretical coherence". However it is difficult to name just one good example of a theory in IS and even harder to find one that is formulated in a precise way which makes it possible to falsify it (as Popper demanded cf. Jarvie, 1998)." (Hjorland, 2000a, pp.517-518)

In his view much of the research work within LIS remains at the level of practical problem solving rather that theoretical development.

" Most work in the field is of a pragmatic nature, which resists scientific analysis and generalisation. However, a lot of papers are published and much work is done without explicating any theoretical or meta-theoretical assumptions." (Hjorland, 2000a, p.518)

It seems possible to question however, despite the confidence of Hjorland's claims, whether his concerns about theory in IS are, in fact, a truth universally acknowledged. Also, even if they are, does that necessarily mean that it is a correct observation and analysis? Finally, even if theory is in this lamentable condition, does it really matter? Perhaps Brookes is wrong and theoretical coherence is irrelevant as long as good or at least reasonable results are produced, which as Hjorland seems to acknowledge, often does happen with IS and IR systems.

I argue that part of the difficulty here is the multiple views in IS and IR of what should be allowed to count for theory. As Sparck Jones (2004) recently argued many of the statistical models from the early work in IR, an important part of IS, are now used in web technology precisely because more complex natural language processing technology, which can be seen as having closer theoretical link to meaning, often does not work well enough. Thus the mathematical IR models (Sparck Jones, 2004), which probably wouldn't count as a theory for Hjorland, are both explicitly formulated and effective at producing term selection techniques. They may not seem to have much to do with language as we know it, they may not be able to explain why they work, and it also may be hard to convincingly falsify them, but they do seem to work.

These models do, however, remain somehow theoretically unsatisfying to some in IS and, in my view, this is because it is hard to relate them to our own experience of meaning and language. One way of understanding Hjorland's project is to see it as an ambition to find a theoretical schema that will both be recognisably about meaning and also produce effective techniques. He is particularly concerned about what he perceives to be the failure of explanation in IS theories. Hjorland's view of explanation appears to be primarily scientific and his argument therefore relies upon the assumption that his kind of explanation can fruitfully be applied to a discipline such as information science.

He uses an example of the way in which a scientist studies cancer cells in order to understand and thus predict their behaviour as a model to which information scientists should aspire (Hjorland, 2000a). He argues that the scientist in this case directs his or her empirical work on the basis of hypotheses: it is not a trial and error process. In IS, however, he argues that trial and error remains the dominant approach. One of the difficulties with his argument here is that he is using science in the aspirational sense identified earlier in the section, rather than in a descriptive or content based sense. It appears that he would like IS researchers to carry out research in the same hypothesis testing way that the scientist does but this rests on the assumption that investigating the nature of cancer cells is similar enough to investigating the nature of information to make this appropriate advice. Thus it is not an argument for information being amenable to scientific study but a reflection of an assumption that information is amenable to scientific study. Cells are the kind of thing about which causal hypotheses can be made and thus it is productive to investigate the nature of these properties using scientific techniques. It is not science because of the techniques: the techniques are just a reflection of the nature of the thing under investigation. If IS borrows the outward appearance of science without acknowledging that its content may be different then this does not bode well for clear thinking on theory development.

Hjorland proceeds to argue that if LIS does wish to become a science it can only do so if it can formulate researchable problems such as whether citation indexing is better than term based indexing. Explanation is an important part of what a theory in IS should be.

> "A theory in Library and Information Science is a theoretical explanation of IS efficiency (including library efficiency, of user behaviour, of the function of different search elements such a descriptors, citations, titles and so on." (Hjorland, 2000a, p.517)

> "A theory of a problem in LIS (e.g. indexing) must be able to provide a theory of the essential factors affecting the quality of that process i.e. the indexer's interpretation of the user's need and the text" (*ibid.*, p.517)

These definitions, however, raise far more questions than they answer. What would a theoretical explanation of a title look like and how could one falsify it? Is a comparison between citation and term based indexing really a researchable problem in the scientific sense? It would appear to be a problem about which one could never have a conclusive answer and one in which causal factors do not play an important role. In a particular sort of IR situation one may appear to be better than the other but that simply means more appropriate in that context. It might be possible to say why it was appropriate, because, for example, in that case high recall was important, but this wouldn't be an explanation of why that particular technique did provide high recall. It is hard to produce theories which are generalisable because of the large number of different possible factors in any IS situation and it is hard to see where the explanation for the behaviour of these factors could reside. Hjorland is right when he says that scientific theories must be generalisable and contain explanations. I argue, however, that he is wrong that theories in IS should or could take this form.

His thesis of explanation requires some kind of pattern, structure and laws or rules within which the explanation can work. One of the key debates in meaning is on the nature of these structures and whether they are in the brain/mind as Chomsky (1957) argues, in our social structure and physical context (Wittgenstein,1953) or in an abstract ideal world (Wittgenstein, 1922; Plato's *Phaedo*, Trans. Tredennick, 1969). The search for an

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explanation, and thus a theory of meaning, can be seen as an attempt to find out how individual instances of meaning fit into a structure and to ascertain the nature of that structure. An important question here is whether there are hidden aspects of meaning that one needs to uncover before this can be achieved. Wittgenstein says no, the structure is our communal life, it is plain for all to see. Our mental instincts or inclinations, however, move us away from this and we try and discover hidden causes as if we were doing science.

Thus, in terms of meaning, Wittgenstein, whom Hjorland claims as an important influence in his work, refutes the need for such a theory. Indeed Wittgenstein claims that the desire to explain meaning by referring to rules about the behaviour of hidden phenomena was the major cause of the repeated failure to understand meaning. Within philosophy in general the failure to distinguish between empirical questions, collecting data to discover explanations, and conceptual questions, analysing the nature of phenomena through intellectual analysis is the cause of nearly all philosophical problems. He is arguing that in meaning nothing is hidden, in a sense there is not a 'why' question to answer. Meaning is the background against which we learn to ask 'why' questions, it is not something of which 'why' questions can be asked. Wittgenstein could, of course, be mistaken but his arguments do raise some issues with Hjorland's project to develop explanations within information science and also, given their very divergent views on theory, the appropriateness of his use of Wittgenstein's philosophy.

The role of interpretation in meaning and information is another difficulty for the scientific approach in IS. In science data can normally perform the role of substantiating or refuting theories. One way of understanding this is to say that there are fairly strict limits to the ways in which data can be interpreted. There are normally facts of the matter that can lead one to favour one interpretation over another. This was crucial to Popper who rejected as science any field of enquiry, which didn't have this characteristic. He rejected for example, Marxism and psychology on these grounds. In his view they are both pseudo science because they can interpret the same event, on either a societal or individual level, in numerous different ways and none of these can emphatically be

accepted or rejected. Popper appears to be arguing here that there are certain kinds of things that are just not suitable for scientific analysis because they will always remain open to interpretation. Psychology may appear to be giving a scientific analysis of human actions but there are no facts of the matter that could prove or disprove its different perspectives on, for example, suicide. It may be here, however, that Popper is rather over zealous in his condemnation. Psychology, for example, can increase our understanding of mental distress, even if, as Popper says, it could turn out not to apply in a particular case. It could be that Popper's falsification thesis may usefully distinguish science from other research areas but this is not to be equated with definitely distinguishing useful from futile areas of research. Thus, even if IS cannot produce falsifiable theories in the way that Hjorland would wish, this may not matter as much as he fears. What does matter is claiming that its theories are scientific if they are not. This question of interpretation in language and the extent to which it can be settled by the facts of the matter is also raised by Saussure (1959, p.8) who argues that language itself cannot dictate how it should be understood.

> "Far from it being the object that antedates the viewpoint, it would seem that it is the viewpoint that creates the object; besides, nothing tells us in advance that one way of considering the fact in question takes precedence over the other, or is in any way superior to the other."

Thus when investigating meaning one can have a model or a viewpoint but, unlike a theory, it will be difficult to collect data that could show it to be false.

Wittgenstein argues that meaning is not a question of interpretation when we are actually using it in particular situations but this does not imply that it is therefore necessarily a scientific question. In his view meaning only appears to be a question of interpretation when we stand too far back from meaning and try and understand it separately from its use. The general relates to the specific in a problematic way in meaning. If an interpretation varies between two different situations it does not necessarily mean that a term is being used incorrectly. It just indicates that, in that particular context, the meaning

was different. Thus the data or context can confirm the interpretation in each particular case but not in a way which is universal. At the same time, Wittgenstein is arguing that these particular instances of meaning only work because we do have a universal and shared form of life. This is not, however, an abstract entity, it is based on our communal physical and social life. Blair (1990) who, like Hjorland, draws heavily on Wittgenstein appears also not to have fully taken on board his view about theories of meaning. Indeed, Blair seems to argue that the relationship between theory and data in science is similar to that to semantics, syntax and pragmatics in meaning. He claims that (1990, p.279) "scientific theory is a kind of signification system, and thereby, is a subset of semiotics".

In science, however, the general theory should relate to the specific (or in semiotic terminology the signified to the signifier) in a much more controlled way than it does in language. The general theory should apply to each instance and, if not, that instance is probably telling us something important about the theory. Thus, data in science can tell us that our interpretation is wrong in a way that enables us to draw general conclusions about why. Data in meaning, however, may tell us that we are wrong in a particular situation but we may not be able to generalise from this.

I argue that it is this crucial distinction which is the cause of the difficulties that IS has with its identity as a science. Debates about measurement are often given a fairly high prominence in IS (Ellis, 1996). It is also seen by some researchers as vital to the establishment of the discipline. Losee (1990), for example, argues that information science needs to be able to overthrow common sense views of information and to do this it needs a way of objectively saying that x has more information than y. In his view this measurement can take many forms, quantitative or qualitative, textual or numeric, as long as it allows some kind of ordering of objects by their respective amounts of information.

I argue, however, that in terms of science it doesn't really matter what you try and measure or how, if the data you collect cannot in principle falsify your theory. Even if Losee is right and it is possible to measure the information content of different objects this data in itself is theoretically uninteresting if we can't relate to general theories. Data

in IS can be very useful in devising appropriate information solutions to particular contexts but generalising from this to universal theories will always be problematic, in my view, because of the nature of meaning and information. Theories of information which do exist, such as Shannon's theory of information, often come from other disciplines and may not relate well to the human use of information which is an essential part of IS.

This difficulty with general theories has been noted by a number of researchers in IS and IR but it is normally taken to be an indication that IS theory needs to be changed or improved, rather than as an indication that IS may not be the kind of thing about which universal theories can be developed. Hjorland (2000a) discusses the conflict between the general and the specific in IS research.

> "The real challenge for Information Science is therefore to develop specific knowledge, which is relatively independent of subject knowledge, but which is not an empty abstraction." (Hjorland, 2000a, p.506)

> "The goal for Library and Information Science is to write a history of its theoretical development abstracted from the concrete technologies in which its principles have been studied." (*ibid*., p.512)

This disjunction is also noted by Bonnevie (2001) who observes that theory in IS tends to remain at the meta level and is not actually implemented at a practical level.

> "The transition between micro and macro level in IS is a real schism, but also a challenge to IS theorists." (Bonnevie, 2001, p.520)

Thus there would appear to be a problem with how general theories relate to specific situations in IS. Hjorland is emphasising this from an explanatory point of view: how can a universal theory explain the diversity of contexts in IS? Bonnevie is emphasising it from an implementation perspective: how can philosophical theories be implemented in

particular IS systems? He is arguing that this is because the theories are not good enough yet and she is arguing that it is because the technology is not good enough yet.

Hjorland claims that IS needs better theories so knowledge can grow in the field. In particular he claims that IS overuses models rather than theories. In his view models cannot lead to knowledge growth because, in contrast to theories, they cannot be disproved by data. Models just reflect a way of thinking about problem whilst theories purport to explain it. I would argue that Hjorland is right in his distinction but wrong to think that such falsifiable theories will ever operate usefully in IS. It is hard to falsify theories in IS, not because they are weak theories, but because information and meaning are not the kind of things that one can have scientific theories about. This is because they require the possibility of multiple interpretations whilst science requires the possibility of conclusively rejecting certain interpretations.

In science knowledge normally grows by the elimination of flawed theories and the development of new ones that fit the data better. Knowledge cannot grow in this particular way if you can never disprove anything. If this is not a failure of methodology but rather, as I argue, an inevitable effect of dealing with meaning, then aspiring to the scientific approach is unlikely to be helpful.

IS, and in particular its sub-field IR, does use what appear to be scientific techniques and methodologies, such as in the large scale TREC experiments (Sparck Jones, 2000). These activities, however, have a fundamentally different relationship between data and theory than those of science. As Ellis (1992a) observes, there is a problem about the reliability of the data because of its reliance on the subjective concept of relevance and there is a problem of validity in so far as it is not clear the extent to which one can generalise from these results. The experiments only concern a particular set of queries, a particular set of relevance judgements, and a particular document collection.

The major argument in this section has been that information science often calls itself a science but that, in fact, it is not a science because its subject matter, information and

meaning, are not the kind of things about which scientific claims can be made. By scientific claim I mean unambiguous theories about the causal mechanism within and between them that could be conclusively falsified. The reason for this is that there is always room for different interpretations in information and meaning. There are strong connections between the physical evidence of meaning and information, such as text, pictures, etc., and how they are interpreted by particular users. There is, however, not the strong causal nature that we normally see in science. As Blair (1990) observes, citing Searle (1969), the link between the brute facts (text) or language and the institutional facts (meaning) always has room for ambiguity. Whether one argues that meaning is objective, subjective or the product of social practice it is still not possible to be scientific about it because, whatever meaning may be, words don't always cause it to happen. There are so many factors which contribute to meaning that it is not possible to reliably predict when and how it might happen.

This still leaves us with the question of how the concepts of information and meaning operate within information science and how this might be investigated. In our previous discussion on meaning we have seen the importance of the subjective/objective divide in understanding different perspectives of meaning and the next chapter performs a similar analysis on the role of meaning within IS. Information is, however, distinct from meaning. There is a strong relationship but also some important points of divergence. It is useful to clarify the nature of these similarities and differences before proceeding with a discussion of the role of meaning in IS in the next chapter. In the next section the particular qualities of information, as opposed to just meaning, are examined.

3.3 What is information?

So far the role of meaning in information science has been discussed in terms of its contribution to understanding how the discipline should be defined and whether it can be validly called a science. Information is a similar enough concept to meaning for discussions within the philosophy of meaning to provide a useful analytic tool for information science. There are, however, important differences and this section analyses how an understanding of these can also be helpful for IS. The ways in which information

is not like meaning are as important as the ways in which it is. I argue that these differences are ones of both content and use: information has some distinct features from meaning and it is also used in some different ways. These differences, however, do take place under the shared shadow of the subjective/objective divide.

Information, like meaning, exists within the tension between the subjective and the objective. Unlike meaning, however, I argue that it also has a strong relationship to the concepts of change and knowledge. These factors do play a role in meaning but their role in information is more pronounced. Meaning has to be about something: it has to have a semantic component. Information also has to be about something but there are stringent conditions concerning the nature of this semantic relationship. These requirements exist on the objective level because it is normally required to be about something that is true or that exists, and on the subjective level because it is normally required that this fact has been communicated and caused a change in knowledge state to somebody. Thus a text would have meaning if it was factually incorrect and nobody ever read it. In order for it to be information it would have to have some relationship to truth and it would have to be read. In order for something to count as information, it is not adequate just for it to be about something, it must be useful for the reader and initiate some kind of change. Information then is, in one sense a kind of object but it is a kind of object that could start a process of change. It contains the potentiality for change and as such it can be seen as more of an active agent than meaning.

This change can occur without the information being true. I would argue, however, that information requires at least an aspiration towards truth or correctness. In our normal use of the term 'information' we are talking about something that is useful and things are generally more useful if they have a strong relationship to reality. It makes sense to say "I was given incorrect information" but we wouldn't normally say "I was given incorrect knowledge". Thus we expect it to aim for accuracy but if it turns out to be wrong this does not normally cause us to rethink our entire worldview. Information then is normally required to have stronger relationship to truth than meaning, but a weaker one than is required of knowledge. An understanding of information requires an investigation into its

relationship with change and knowledge. This section begins with an examination of the concept of change and this is followed by a discussion about knowledge.

3.3.1 Change

Change is a central concept in information. In order for something to be defined as information it has to have some effect or initiate some kind of change. Views on the nature of this change vary depending on the different perspectives on the nature of information. Theories of information that emphasise the objective aspects of information understand change as changes in signals which can be measured (Losee, 1990; Shannon and Weaver, 1949). The more subjective approach normally sees this change as a shift in the user's knowledge state. Brookes (1980) argued that the fundamental equation of information science was the extent of the change in the knowledge state of the user. The use of the mathematical term 'equation' to describe knowledge change, an event that is both conceptually imprecise and problematic to measure, is revealing. Here we see an acknowledgement that information is a human process but also a desire to maintain mathematical and scientific terminology in how we discuss that process. More recently, Cole's study of how history students become informed starts with the central question "what kind of modification of knowledge structure constitutes 'information'?" (1997, p.58). He concludes that this is, to an extent, an accumulation of subconscious factors that somehow trigger an awareness that the students have a gap in their knowledge, which then requires filling. Thus there is not only the problem of how we can measure that someone's knowledge state has changed but there is also the difficulty of understanding how they come to realise that such a change is desirable or necessary. This also reveals the complexity of factors involved: for someone's knowledge state to alter there has to be a successful interaction between their perceived need for information and the information they actually manage to find.

Some commentators look to early philosophy to try and improve our understanding of what this change could consist of. Capurro (1992) claims that since the 16th century information has lost the ontological meaning of giving form. Here he is referring to the decline of the Aristotelian view of change, as discussed in *On Generation and Corruption* (Trans. William, 1982) which was that it involved a change in form but normally a

continuity in matter. This is a very physical view of change and it must also be remembered that there was no clear distinction between science and philosophy at that time. Aristotle was trying to explain the nature of the changes that he saw in the natural world. In Aristotelian terms what remains the same is matter, which could be understood as content, and what changed was form, which can be understood as how matter is shaped or organised. Capurro argues that information now means change of any sort: it is no longer seen as a way of shaping or ordering matter or content. The thesis that the traditional Aristotelian view of change has been discarded is not shared by all philosophers. Kenny (1980) argues that we still view information as a physical change in the mind and that this is a legacy of Aristotle's ideas. Kenny, as a Wittgensteinian, argues that this inappropriate use of a physical analogy for a mental process is often a cause of philosophical problems. Talking about change in this way is the wrong language game for discussing how we become informed. In terms of IS, however, I argue, it might be useful for understanding what happens to documents when they are organised into an information system. This is a physical system so the physical analogy can be appropriate. The assumption, however, that this physical analogy can equally be applied to the experience of becoming informed, appears to be over simplified and incorrect.

I would argue that, if we take the Wittgensteinian approach and examine how we normally use the term 'information', then it does appear normally to imply a kind of change which increases order or organisation. We do still see it as the imposition of order on disparate facts in order to make it possible to find and use their content. This is true both in the subjective and the objective sense. Indexing documents for an IR system would be seen as increasing the information in the system; randomly deleting terms would not. Both of these actions change the system but only one does so in an informative way. We would also not normally say of someone that they became informed on an issue when it was clear that their understanding of it had in fact deteriorated or become confused.

Change, regardless of possible detailed interpretations, must involve something that retains some kind of identity but that is also altered. Within information it is generally the

content that is a constant and the way in which that content is organised that is altered. This ordering can happen on an individual basis, for example, the indexing a particular document, or on a collective basis in terms of placing that document in a particular relationship to other documents, for example in the shelving of a library book. Thus documents are changed in such a way that they will be easier to find; they are changed so they are more likely to change the user. Both the document and the user maintain their identity throughout this process but certain aspects of them do alter.

An understanding of this process can be helped by using the Aristotelian distinction between potentiality (in modern terms the fact that the document might inform us) and actuality (the fact that the document did in fact inform us on a particular occasion).

> "Actual knowledge is identical with its object. But potential knowledge is prior in time in the individual, but not prior even in time in general; for all things that come to be are derived from that which is so actually." (Aristotle, *On the Soul*, Book III, Chapter 7, para 1, Trans. Hamlyn, 1968)

The organisation and structuring of documents can be seen as efforts to maximise the chance that their potentiality will be transformed into actuality. There are features of the document that may cause change in a user but certain things have to happen before that change actually takes place. Firstly they must realise that they need the information, secondly they must be able to find it and finally it must be in a form that they can understand and use. Hjorland (1997) argues that until a document has changed a user's understanding it is not information but just a document. Thus a document can be understood as anything, not necessarily a textual object, that has the potential to inform. It is only when this potential becomes actual that it becomes information.

Potentiality and actuality play a role in both information and meaning. In both cases there is the distinction between the factors that make them possible and the actual experience of information and meaning. If someone is to be informed by a document, the document must exist but its existence is not the same thing as the user becoming informed; it is a

necessary but not a sufficient condition. Meaning also requires syntax in order for anything meaningful to be said but a sentence can follow these rules and still have no meaning; it could just be a nonsense sentence. This distinction between syntax and semantics, as discussed in relation to Searle's work in the previous chapter, can also provide a perspective on the possible nature of the change caused by information. If the change is to be meaningful or have semantic value it must cause some change in understanding rather than just a change in structure or procedure. In terms of the Chinese room argument the question would be whether the instructions which cause a change of behaviour and output, but not of understanding, should be allowed to count as information. There is also the question of the extent to which structure or syntax can remain the same but have different semantics or content and the extent to which the same semantics or content can be expressed through different structures or syntax. This will be discussed in more depth in chapter 5 on IR.

The process of change in information relies on some form of communication. Information cannot change someone if they can't find out about it. Communication is also seen as crucial in the objective view of information. Shannon (1949) requires that there is some change in the receiver in order for message transmission to be deemed successful. Communication relies upon some shared system of meaning, even if this is only at the level of code, and this is one of most important aspects of the relationship between information and meaning. In a Wittgensteinian sense there is no such thing as a private document: the concept of a document that could never inform is untenable. Even if a document is never read and thus cannot be said to be information its existence still relies upon our shared meaning and language. Without them it could not have been written and, because it relies on this shared understanding, it will always have the potential to become information.

Thus information requires change, change requires communication and communication requires the shared understanding and practices of meaning. Meaning then supplies the conditions that make information or change possible, its potentiality, but they do not necessarily make the change happen, its actuality. These are conditions that are necessary

in order for the change required by information to take place. There still remains the question of what exists before the change happens and what exists after the change happens. What does information change from, or what are its raw ingredients, and what does it change to, or what is its end product? This question leads us onto the next discussion about data and knowledge.

3.3.2 Knowledge

Knowledge is generally understood to be something that is true. Truth is clearly a complex concept but it is normally required that what we hold to be true does, in fact, exist in the external world. There needs to be a relationship between our understanding and reality and we need to have made a claim about this relationship. Thus the relationship between information and knowledge is a question of information's relationship with the external world that it purports to represent and also our social and academic structures which work with knowledge. How does information represent objective facts and how does this lead to what we call knowledge? Traditionally information has been seen as something that is done to data and the resulting information eventually leads to knowledge (Boisot, 1995). Data is relatively unstructured material that is then organised in such a way that it can become information. Eventually this information will become knowledge when it becomes part of our established body of learning. Thus data, information and knowledge are seen as existing on progressively developed levels of organisation and certainty. In order for data to become information some kind of change has to take place by which it becomes more ordered and structured. This change or new status also makes it easier to communicate and share with others. Finally, it can become knowledge which is more structured, has higher status and is seen as more enduring. Boisot argues that as it moves from data to knowledge it becomes more meaningful. One way of understanding this claim from a Wittgensteinian perspective is that information is an explicit representation of our shared structures and understanding which make meaning possible. It provides a model of our shared knowledge structures. The structure that we put onto data, in terms of organising and identifying meaning, enables people to navigate it using meaning as their guide. In our day to day use of language we can see the structure in action, but as information is relatively divorced from its context, some kind of structure has to be explicitly added.

There is, of course, the problem of how widely shared these knowledge structures actually are. Boisot observes that specialised knowledge may be hard to codify and communicate and thus only be shared by a small number of experts.

It is, however, not necessarily valid to argue that information should always be seen as kind of stepping stone to knowledge. In some cases information can very usefully remain at the level of particular facts which don't necessarily ever develop into part of structured knowledge. A hospital patient could, for example, learn useful factual information about his or her condition but this probably won't develop into full medical knowledge or understanding. A train passenger might learn the timetable for their route but would feel no need to learn the timetable of the entire network or to understand how the scheduling is organised. Thus in both these cases the information does rely on the wider body of knowledge but an individual can use that information without ever gaining the wider knowledge for themselves.

Information is closely related to knowledge but it is also distinct from it. In Putnam's (1999) recent work he argues that knowledge implies both an objective relationship with the world and an evocation of our social and justification customs for establishing this truth. Knowledge is not only what we know but a description of how, as a society, we decide to find out and justify what we regard as true. Thus by knowledge we mean both something that has a particular relationship with the world, and also that has a particular function in our society. The reference of knowledge can be understood as the world and the use of knowledge can be understood as how we organise and use or understanding of the world. How we use knowledge is important but it is not its only defining feature. It is fundamental to the concept of knowledge that we can be mistaken about it. Knowledge must have an objective reality outside our perception of it.

Can this distinction between knowledge's relationship to the external world and its relationship with our social structures assist us in understanding how information may be different from knowledge? One way of understanding the distinction between knowledge and information is to see information as being closer to our social justification customs

than knowledge, whilst still retaining claims to a relationship with the world. This, in some ways, brings it into a closer relationship with meaning, as there remains room for interpretation. Information is required to be both usable and useful. In order to perform this role it must have some relationship to the truth but only in so far as is necessary for a particular purpose. Knowledge is required to have a very strong relationship with truth and this is more important than its immediate usefulness. Hjorland (1997) argues that information and knowledge have a different relationship to time in that information is more transient because it depends on a particular situation whilst knowledge is more permanent.

Thus information has a problematic relationship to knowledge and this has implications for an understanding of how meaning plays a role in this process. The two aspects of meaning, its aboutness or relationship to external objects and its inner subjective experience or significance to the individual are both manifested in information and knowledge. In terms of understanding the nature of information an acknowledgement of knowledge is important, but the emphasis remains on the human experience of that knowledge rather than its abstract nature. In knowledge there is little room for interpretation, but in both information and meaning there remains room for interpretation. The limits of interpretation in both cases are our social context and the reality of the external world. In one sense information is normally required to have a stronger relationship with the latter than with meaning. We expect information to be correct but we acknowledge that something can be fiction but still have meaning. In another sense information is required to have a stronger relationship with social context. Information is meant to be accessible and used whilst something can have meaning even if it is very hard to find and only understood by a tiny minority. Thus, to an extent, information is caught within the conflicting requirements of meaning and knowledge. We want it to be true and we want it to be useful. Its usefulness relies on its truth but an overemphasis on accuracy over availability or speed often renders information useless.

Capurro (1992) asserts the importance of misinformation, by which he means information that is wrong. It appears to refer to fact but the fact is untrue. He argues that the

possibility that information could be wrong is an important part of its identity. This could be seen as one way of understanding the distinction between information and knowledge.

Our use of the term 'knowledge' normally implies truth; this is not necessarily the case when we use the word 'information'. Something can count as information but not in fact be about the objective world; information is something about which it is possible to be mistaken but knowledge implies truth. Information then has a slightly looser relationship to our concept of truth than knowledge does. People are still left to decide for themselves whether they will trust it and how, or indeed if, they will use it. Knowledge, in contrast, implies one correct understanding and interpretation. When we find out that what we thought was knowledge is wrong, for example that the sun does not revolve around the world, then we would no longer call it knowledge, it becomes a mistaken belief. Information implies the provision of material that will then be used to make a decision, but there is not necessarily the assumption that there is only one correct outcome. Different interpretations of information are seen as possible and this is even more the case with data. The continuum from data to knowledge implies that they become more meaningful but part of this view may be the acknowledgement that the number of possible interpretations is reduced. Thus, paradoxically, meaning is gained in one sense as there is a clearer view of the meaning but lost in another sense as possible interpretations are discarded.

Information is more contingent on the perceiver than knowledge. Knowledge can either be knowledge for everyone or for a small number of people. The same piece of information, however, can be information for someone and not for someone else (because, for example, they already knew it or it is in a foreign language that they do not understand). Information decreases with certainty, knowledge increases with certainty. Data have even more of this freedom and potential, they are still awaiting numerous possible interpretations. Knowledge is actual and thus has lost much of this fluidity.

Information is also different from knowledge because it is more contingent on particular circumstance, the demands made of its accuracy are less, but the demands made on its

pertinence are higher. Thus, to use a ship's captain as an example, it would probably be wiser to choose approximate information on the location of an imminent obstacle, providing it was adequate to avoid it, than to wait for certain knowledge, which may be too late. Information then is more pragmatic than knowledge, it is more connected to our everyday concerns and problems rather than out abstract ones. Hjorland (1997) argues that in theory we could collect an infinite amount of information before we make a decision; in practice, however, we just collect an amount which we consider reasonable in that particular context and then we act. This can be related to Bradford's (1934) law that only a small number of journals in a particular discipline will contain most of the pertinent articles. Thus the wider one's net is cast the less likely it is that a high proportion of what is found will be about the discipline. Generally most of what is relevant can be found fairly quickly and, after a certain point, further searching is unlikely to be useful.

Information then is distinct from knowledge, in terms of it relationship to truth, and it also has a different relationship to knowledge than meaning has. Information, like meaning, has more room for interpretations or different perspectives than knowledge. Unlike meaning, however, it is expected to have a fairly strong relationship to truth. It is also expected to be more useful though this requirement is often both dependent upon and in conflict with its demands for accuracy. Meaning operates within the conflicts of subjectivity (intension) and objectivity (extension). Information also operates within these conflicts but in a slightly different way. Its requirement to change, or to alter somebody's subjective mental state, is both reliant on its objectivity but also at odds with it. Information then has a dialectical conflict between its two main requirements. It has to be subjective in a particular way, one that requires change, and it has to be objective in a way which facilitates rather than hinders this.

3.4 Conclusions

In this chapter the question of the meaning of information science has been discussed both by looking at its function or use and by looking at some of its central concepts. This discussion has revealed the problematic nature of the content/use distinction. The

argument that information science is primarily defined by its perspective on its content or subject matter, rather than the intrinsic nature of its subject matter, appears convincing in many ways. It, however, still leaves us with the question of what exactly is the nature of this perspective. When we say that we are focusing on the information aspects of a particular subject what exactly is meant by that? This led to a discussion about whether such a question can be addressed in a scientific way and it was concluded that this was not the case. Science requires that data has strictly limited interpretations and, mainly because of its relationship with meaning, this is not the case with information.

The discussion on change and knowledge described some important features of information or how to recognise something as information. In this thesis information is taken to be something which causes some kind of change and this change has something to do with knowledge though it is distinct from knowledge. Information, to a much greater extent than knowledge, has room for different possible interpretations. Knowledge normally implies some kind of closure or decision about the facts of the matter; information can be understood as part of a process of change that precedes this closure. Information shares in many of the philosophical issues raised by meaning. It is concerned with both the subjective and the objective aspects of meaning in that it requires both a subjective or internal experience as well as some relationship to the objective external world. It is also related to meaning in the sense that to count as information it must have some kind of significance or pertinence. Data is often understood to be meaningless until it is structured and analysed into information. This is part of its relationship to change: it must have some kind of effect to count as information, something must have been altered. Finally it has a problematic relationship to truth and knowledge. It appears that information does not always have to be true and this may be because it can have a strong effect even if it is not true. This would imply that its effect on human agents is more important than its relationship to the objective external world. The next chapter proceeds to examine the extent to which this subjective/objective divide or duality can provide more insights into the role of meaning in information science.

4 Meaning in information science

The previous chapter analysed the question of the meaning of information science. This chapter analyses the role that meaning plays in information science. The central argument is that the subjective/objective divide, which is so central to our understanding of meaning, is also crucial for an understanding of information science. It begins with a review of the important issues and problems in meaning and proceeds to argue that they play an important role in information science. If work on understanding meaning can be understood as a process of splitting it up into its subjective and objective aspects and devising ways of how they could relate, then how might this relate to work on understanding information science? I argue that the different approaches within information science can be clarified by analysing their respective views on the subjective/objective divide and their proposed solutions.

Before proceeding with this analysis the main issues in meaning, which the previous discussion has left us with, are summarised. Firstly, there is the question of the extent to which meaning should be understood as subjective or objective. This is the discussion about whether intension, the inner experience of meaning, or extension, what meanings refers to in the world, is the main characteristic of meaning. If meaning is subjective then the most important thing about meaning is that we experience it in our minds. If meaning is objective then the most important thing about it is the way a word corresponds or stands for an objective reality. The objective aspects of meaning also include our relationship with others or our collective and social life. These two aspects of meaning lead onto two further questions.

There is the question of how can we be sure that words are used consistently: how does meaning manage to be normative rather than just descriptive? We know that in meaning there is normally some room for interpretation but that this is not limitless. There are certain shared rules or conventions that make most meaning use fairly consistent; this is essential or communication would not be possible. There must be some way in which the rules of meaning can be learnt, understood and enforced. In a purely subjective view of

meaning it is hard to explain how an isolated individual can check whether his or her interpretation is correct; there is a problem of enforcement. In a purely objective view of meaning it is hard to explain how these rules are successfully used; there is a problem of learning and understanding.

Finally, there is the question of the extent to which it is pertinent or possible to develop a theoretical structure about meaning and whether this will ever be able to explain how the subjective and objective aspects of meaning actually operate and how, and indeed if, they interact. This is a question of where one should look if one wants to understand meaning. Does one examine the inner experience, the external world or some way of bridging this divide?

It is argued that in all these problems the major theme is the nature of the subjective/objective divide. Proponents of the objective perspective on information science are discussed in the context of their views on the key meaning questions as they have so far been identified. These are the nature of the internal and external aspects of meaning, its normative role and the nature of developing theories of meaning. This analysis is then used for the proponents of a more subjective view of information and finally for the perspective which emphasises the importance of social practice. Conclusions are then drawn on the role of meaning in information science and the extent to which a clarification on the different perspectives on meaning can assist in clarifying the nature of the discipline.

4.1 The subjective/objective divide

The subjective/objective divide is very important in understanding information science. Brookes (1980, p.126), who seems to assume that IS is a social science, claims that:

"Of all the social sciences, IS is the most intimately concerned with the interaction between the mental and the physical processes or between subjective and objective modes of thought."

Hjorland (1998b) argues that this interaction has been badly managed both in IR and IS.

> "In my view, the fundamental problems of IR (as well as for IS as a whole and for many other disciplines) is that it has been caught between individual objectivism and subjectivism." (Hjorland, 1998b, p.28)

Raber and Budd (2003), in their discussion of semiotics and IS, highlight the complex set of relationships that exist within IS. In my view all these relationships can be understood as part of the primary relationship between the subjective and objective.

> "Both semiotics and information science are concerned with the nature of relations between content and its representation, between signifier and signified, between reference and referent, and between informative objects and their meaning." (Raber and Budd, 2003, p.507)

Capurro (1992) emphasises the negative effects of this divide on IS, arguing that it is an unwelcome philosophical legacy, which should hold no place in a modern hermeneutical (based on interpretation) understanding of information. In one sense this divide may have had an enduring and unwelcome influence on IS in so far as it has polarised the debate in a way that has caused stagnation. There are certainly many interesting philosophical problems with this divide, but almost regardless of its validity, it has had a strong influence on the field. As Frohmann argues (1992) theoretical discourse can be analysed as a subject in its own right and, within IS, much theoretical discussion has been generated on this problem. Thus information science cannot really be understood without first dealing with the nature of this philosophical divide.

Information appears to exist between the two elements of this tension. Information must be objective in that it must tell us something about the world; it cannot just be a trivial or analytic statement. It must also, however, be subjective, in that it implies some kind of communication of this information, which changes somebody's knowledge state. Both these aspects of information can be understood as part of its relationship to meaning in so

as far they reflect the need for both intension, or subjective experience, and extension, or correspondence with reality.

Discussion in information science on the extent to which information is subjective or objective is often aligned with views on the problem of measuring information. In one sense objective features of information, such as word frequency, are easier to measure, and thus appear to be the kind of reliable data needed to develop a science. The more qualitative tradition Ingwersen, (1992; Cole, 1997; Greisdorf and O'Conner, 2002) however, questions the validity of this quantitative data, and disputes the role that it can have in actually improving our understanding of information. The methodologies of this tradition, in contrast, often involve interviews with users and observations of their behaviour, for example recent work by Sonnenwald *et al.* (2004). Within the cognitive tradition it is assumed that even if objective features of documents can be measured this is not necessarily an indication that they will result in the experience of information; they may not, in fact, change somebody's knowledge state. The relationship between the objective existence of information and the subjective experience of becoming informed is one with no guarantees.

The different traditions within information science can be understood as different positions on the relative importance of the subjective and the objective aspects of information. These differences can be seen both in views on the purpose or function of information science and in views on the nature of its fundamental concepts. The tradition that emphasises the objective or the external aspects of information focuses on developing a science of information. It therefore concerns itself more with the measurement of changes and structure that occur in the objective or the external world. The tradition that emphasises the subjective aspects of meaning aims to understand the qualitative experience of information. It is therefore more concerned with the changes that occur in knowledge states of the information user, a focus that has different implications for measurement. In general the greater the focus on the subjective the greater the explicit role that meaning plays in the theoretical developments. This section begins with an analysis of the tradition in information science that focuses on the

objective aspects of information, and then proceeds to discuss the more subjective approach. Finally the more recent tradition of understanding information as part of social practice is discussed. In each case the different perspectives' approaches to the major questions within meaning are discussed. These are the nature of the subjective/objective divide, the ways in which interpretation in meaning is limited and the possibility of developing a theory of meaning.

4.2 Objective approaches to information

The concept of objectivity is not straightforward but it can broadly be understood as something that is outside an individual's mental experience. The philosopher Thomas Nagel (1986) called objectivity "the view from nowhere" but he argued that this hypothetical viewpoint is always in some kind of relationship with a subjective perspective. Thus in one sense objectivity is subjective as it does depend on one's perspective. Searle (1984) argues that one can be objective about subjectivity: it is, for example, an objective fact that people have subjective mental experiences. Both objects and other people's subjective experiences are outside my subjective experience so, in this sense, they are both objective.

Hjorland (1997, p.89) defines objectivity as both inter-subjectivity (i.e. agreement between people) and an agreement with reality and argues that these are inversely proportional. The properties easily identified by the many will probably be the less significant (or least indiscriminate) so thus less objective in the sense of agreeing with reality. It is not clear that this is actually the case and it would appear that in this statement Hjorland has been overly influenced by his high regard for science. Commonly shared knowledge does often correspond with reality in so far as this is necessary for most people. Scientists, because of their specialist perspective, may wish to investigate the nature of common objects in more depth, but this understanding is not necessarily more objective. Also, as Putnam (1973) argues, this kind of knowledge is social in nature. As long as some people have the specialised knowledge, for example to be able to identify gold, then society as a whole will be able to use the word 'gold' correctly. Thus objectivity is not just a feature of objects but also a product of our institutions and

systems for sharing our knowledge of these objects. Objectivity, then, contains some diverse and potentially contradictory elements. It is often used in an attempt to remove indeterminacy from the nature of information science but its role in this enterprise is not always entirely unproblematic.

The classic text of objective information theory is Shannon and Weaver's (1949) work on communication channels and information theory. Although it is normally seen as an exemplar of objective information theory it does not, in fact, discuss the relationship of the signal with the external world, which would be seen as crucial in establishing objectivity in most cases. This focus on syntax over semantics reveals another paradoxical aspect of objectivity. Syntax is normally seen as objective in that it is not open to interpretation. It is, however, a human construct. Semantics is normally seen as subjective because it can be open to interpretation and normally implies a subjective experience of meaning. It does, however, concern a relationship with objects in the world and thus, in one sense, is more objective than syntax.

Shannon and Weaver's work makes the distinction between signal and noise. It is important to be able to measure these and reduce the latter if one wants to develop a transmission system. Information can be measured to the extent that it is inversely related to the probability of an event. The rarer the occurrence of an event the more information it will carry. If an event is almost certain to occur then the amount of information it contains is very low. The theory also includes the role of communication; if information is to be of use then it must be transferred, preferably without the information being distorted. This requires the lowest amount of noise to facilitate the maximum amount of signal. In the ideal noiseless communication channel the information is received with no noise and thus no ambiguity or equivocation. There is complete certainty that the message has been received in the identical state in which it was sent. There is no room for interpretation.

The concept of the inner experience of meaning does not play an explicit role in this work: the significance or otherwise of the message is not discussed. It is argued, however,

by Losee (1990) that the concept of probability included in their definition of information, whilst in one sense being objective, does not really have any significance apart from our perspective on it. Thus in order for probability to have any meaning the role of the subjective human must be acknowledged. If an event's information is inversely related to its probability, this seems rather similar to saying that its pertinence will depend on the extent to which it doesn't tell someone what he or she already knows. Thus even in avowedly objective views of information the subjective experience of information is hard to completely discount.

Many of the more objective views of information have as their motivation the desire to conceptualise information as something which can be measured. Indeed, Losee (1990) argues that Shannon and Weaver's work is theory of measurement rather than of information. This emphasis on measurement could be argued to lead to work which attempts to fit information into a scientific framework rather than to use the scientific framework to understand information. Thus in terms of its perspective on meaning the main questions it concerns itself with are the external or physical aspects of meaning and the question of developing a theory. The theory question is seen primarily as a problem of developing techniques of measurement. The nature of both the world which may be represented by the messages and the effect it has on the subjective experience of the recipient are not seen as important elements of the theory. It is about the syntax or structure of the message rather than the semantics or the content.

There is a normative aspect in Shannon and Weaver's theory and a strong emphasis on ensuring that the only possible interpretation of the message received is identical to the message sent. In order to ensure this there must consistency of communication. A perfect transmission contains no noise: it is certain that the message sent is the same as the message received. This also implies that there can be no room for interpretation because this raises the possibility that there may be differences between the two messages. The content of the message, in terms of how it relates to an external reality or how it is subjectively experienced by the recipient, is not seen as crucial to the theory but the noiseless transmission of the message is. The truth or otherwise of the message in terms

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of correspondence to the external world is irrelevant to the successful transmission of the message. At the same time, however, the noise/signal distinction does seem to rely on the viewpoint of the person for whom that distinction matters. Noise and signal are not intrinsic qualities of message: it all depends on what you are looking for. In some cases the noise could provide information that the person sending the signals may be unaware of. It could, for example, indicate the proximity of a hidden object, which is disturbing the signal. Thus this perspective includes the distinction between valid and invalid aspects of the message and the engineering required to reduce the invalid elements, but it does not discuss how this distinction operates outside the confines of the message.

More recent work within the objective tradition of information science emphasises the importance of the discipline gaining scientific credibility and the importance of developing techniques of measurement to contribute to this goal. Meadows (1987, p.6), in his discussion of the main elements of modern information science, states that "the desire to make quantitative statements about information is another of the themes evident in modern information science". Losee (1990, p.vii) argues that it is necessary to collect data in information science that can overthrow our common sense notions of information. In terms of theory building this is the scientific model as discussed by Popper (1968); data needs to be collected which is capable of falsifying or supporting hypotheses. It is a very different approach from Wittgenstein's, who in contrast, argues that we should strive to see our common sense view of meaning in a new light, rather than obscure the view by adding a theory. Losee does acknowledge that data in information science is of a diverse nature and allows that techniques of measurement can be qualitative or quantitative, numeric or textual, as long as they are capable of measuring the amount of information in the media concerned. He defines information as:

"a perceived change during an observation of nature, where a perception is the result of a system of events allowing the change in nature to physically modify the recipient in some way. Unlike data, information contains no redundancy, likewise it lacks the structure that knowledge gives to information." (Losee, 1990, p.43)

This definition, however, raises more questions than it answers. The recipient needs to be physically modified in some way but why physically and in what way exactly? Information, as it is generally concerned with communication, normally contains quite a high degree of redundancy in order to ensure that the message does get through. Thus, if information is to reliably effect change then redundancy is probably essential. Losee here is using change to clarify the nature of information but the concept of change is not itself clarified. In most cases the change that occurs in information is required to have some meaning and significance and he does not explore this distinction.

Losee argues that if a scientific theory is to be developed about information then reliable data concerning the hypothesis of information as physical change needs to be collected and this requires measurement techniques. Measuring objective or external elements of information, such as term frequency, is possible; the internal or subjective is much more difficult. It is relatively straightforward to measure the factors that may cause the change necessary for information. It is, however, much less straightforward to measure whether the change has actually happened in the recipient and to what extent.

The aim within the objective tradition is to measure the information in the external world in order to develop theories about it. As Wittgenstein, observed, however, this world is not a given, even the process of pointing to a piece of information assumes an understanding of the practice of pointing. Even if we find out a lot about objective information this cannot explain or define to us how we use or experience the information: the object cannot prescribe its use.

It is not, however, valid to say that meaning is totally ignored within the objective tradition. Rather it is just that only selected aspects are given prominence: the aspects that are plain to external view and amenable to quantitative analysis. The focus is on the structure of information rather than on the content or semantics. The move away from this objective tradition in information science was prompted by concerns that the inner or subjective experience of the user was not being considered and that the scientific approach was producing quantitative results which were not a valid reflection of the

experience of using information. Thus the factors that may cause information to happen were being quantified, but the change that is necessary for information to have actually happened was not being considered. The shift was a move against the emphasis on the objective, or the factors that make information possible, towards the subjective, or the nature of the actual experience of information as it happens. In terms of meaning this can be seen as a shift away from syntax or the form of meaning towards the semantics, or the content. There are two possible implications of this change in focus, either an emphasis on investigating the user experience and/or efforts to increase the complexity of textual representation beyond the level of statistical frequency of terms. IS mainly took the former approach whilst IR has mainly focused on the latter.

4.3 Subjective approaches to information

This perspective within information science concerns itself more with establishing the nature of information and our experience of it rather than necessarily to establish the field as an area of scientific enquiry. It takes as its primary focus the human subject and aims to learn from that in order to develop more effective IS systems. Perhaps the first information scientist to adopt this perspective was Vannevar Bush (1945) in his influential paper *As we may think*. His argument was that information storage and retrieval should be based on the way we think rather than having to change the way we think to fit in with an artificial indexing system. In particular he emphasises the importance of association in human thinking, which he contrasts to the then hierarchical methods of indexing.

> "The human mind does not work that way (hierarchically). It operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain."
> (Bush, 1949, In: Meadows, 1987, p.259)

In his view human thinking could not be completely replicated but that aspects of it could be incorporated in IS systems.

"Man cannot hope to fully duplicate this mental process artificially, but he certainly ought to be able to learn from it." (*ibid.*)

The subjective approach to IS then, which is normally known as the cognitive tradition can be seen as an effort to bring meaning, in terms of intension of subjectivity, more to the forefront in IS. One of its major proponents, Ingwersen (1992), explicitly distinguishes this approach from cognitivism. He defines cognitivism as the theory that mental events can be understood by using the computer as a model of how the mind works. Cognitivism in one sense can be characterised by the desire to take meaning out of thinking by showing that it is formal syntax rather than subjective semantics which are most important. The cognitive tradition in both IS and IR, in contrast, is normally concerned with the importance of semantics over syntax. The ambition of such work is to learn about human understanding of information and use this knowledge to build information systems that more accurately reflect how people use and interpret information. This is not meant to imply that human thinking is a computational process.

If the objective tradition can be seen as concerning itself with what information is, then the subjective tradition can be seen as concerning itself with what information means. Thus it begins with the experience of information: in terms of Nagel's bat the question would be "what is it like to be informed?". Its focus on the inner or experience of information can therefore be aligned with the subjective view of meaning with its focus on the mental experience of intension. Unlike the objective tradition, it is not primarily concerned with the factors that make information possible; rather it examines what actually happens when information does occur. It is the actuality rather than the potentiality of information that is seen as paramount. This can also be related to the distinction between meaningfulness, following the structures or syntax of meaning, and meaning, the actual semantic experience.

One of the subjective tradition's major research questions is the nature of the mental event that constitutes becoming informed. Thus it is a rather individualistic perspective and is more psychological than sociological in its approach. Ingwersen (1992) argues that

information is dependent on a particular user in a particular situation, thus it is not possible to measure information in a general objective sense because it will always depend on particular circumstances. This thesis does rather rely on the assumption that particular circumstances are a subjective rather than objective event. It is the case that, because information is so dependent on context and interpretation, it will have different meanings in different circumstance for different people. Is it not, however, an objective fact that people find themselves in different information situations? It may not be possible to develop general rules about information, and here we can see an echo of Wittgenstein's concerns about general theories of meaning, but that does not necessarily imply the primacy of the subjective. There is also the problem of the actual significance of these differences. Wittgenstein's thesis is that meaning does differ in different contexts but that there is also a common shared core of meaning. Our context is both our general, but not abstract, shared form of life and also our use of meaning in particular circumstances. There is then an inherent tension in the appeal to particular contexts because each particular context only works because of its relationship to our wider shared context.

The methodological implications of this emphasis on particular experiences of information are a focus on user studies and elicitation techniques to gain insight into how people experience information systems in context. As Marcella *et al.* (2002) argue in their study of the impact of new technology of the use of parliamentary information.

> "The authors believe that the phenomenological study of the individual life situations of the information users and the context of their information behaviour is a very significant area for further exploration." (Marcella *et al.*, 2002, p.203)

Cole (1997), as another example, studied the ways in which students became informed in the humanities and concluded that some information seeking was driven by unconscious or semi-conscious motivations and awareness that something was lacking in their understanding. Borlund and Ingwersen (1997) also focuses on the experience of particular users in task based situations. The difficulty is that it is hard to gain conclusive data from most of these studies. Meadow and Yuan (1997, p.712) concur that it is

generally impossible to know all the elements of information that lead to a given decision. The very process of investigating a person's mental experience affects the nature of the experience; measurement changes what is being measured. They conclude that, despite this, general data can be collected about the nature of the user's knowledge, how it was created, how decisions were made and the effects of those decisions. The issue of measuring the nature of inner experience, which is given such prominence within this tradition, can be seen as a reflection of the difficulty of relating the inner experience of meaning to the external world and other people.

The cognitive tradition has received criticism for its focus on the individual experience of the information user. In Wittgensteinian terms the thesis that the inner experience of information is somehow clear, whilst the objective external aspects are uncertain, is a reversal of how our mental experiences should be understood. Any inner experience relies on the existence of our social context and relationship with the world. Frohmann (1990) critiques the dominance of mentalism in the cognitive tradition. Mentalism is the view that understanding is a hidden and private experience. Frohmann accuses the cognitive tradition of an undue focus on the role of the individual in formulating information. The cognitive tradition does stress the importance of interaction but this is often understood (Ingwersen, 1992; Oddy, 1977) as some kind of process occurring between the user and the information system rather than a wider picture of the user's social context.

Thus in terms of meaning, the subjective tradition has tended to neglect the social and the external aspects, which makes it difficult for it to explain a number of important aspects of information. The key thesis of interaction is often assumed to be some kind of process between a system and a user. This, however, is a very problematic concept. Any user is in a constant state of interaction with both a particular social and physical context and also a wider general context. Indeed the whole concept of a human interacting with a computer is a fairly strange model and certainly raises difficult philosophical issues, which are not normally discussed within this tradition. In Wittgensteinian terms computers and users do not share a form of life and thus the chances of them successfully participating in a

language game are limited. Without this shared understanding successful interaction is likely to be limited. The normative aspect of meaning and thus of information is also difficult to account for as the emphasis is so much on individual experience. What criteria could be used to ascertain if the information received is correct, both in terms of how it relates to the world and whether it has been correctly understood, if the main criteria for information are seen as the individual experience of it? The emphasis on the subjective experience of user satisfaction is in many ways in conflict with the goal of effective information retrieval. Hjorland (1997) argues that in many cases users are only satisfied because they have no idea how much information they have failed to find.

Theory development within this tradition is normally seen as using the qualitative experience of users (Ellis, 1984) to somehow explain what is happening in particular information situations. Thus there is desire for explanation and the hope that this can come from investigating how people experience information. Is it really the case, however, that finding out what it is like to be informed is the same as or could even lead to explaining how one becomes informed? It does provide a fuller and thus more accurate description of how information is experienced, in terms of Nagel's view of subjectivity and objectivity, information would appear to be a good candidate for requiring an understanding of a point of view in order to grasp its nature. Whether this understanding is the same as an explanation is another question. Wittgenstein argues that in terms of meaning one should stay with the description and avoid the temptation to dress it up as an explanation.

Ingwersen (1992) argues that the goal of the cognitive tradition should be to discover enough about a user's experience of information to enable systems to be built which can mirror this experience. This would reduce the current high level of misunderstandings in the interaction between system and user. Hjorland (1998a, 2002), however, argues that user studies have consistently failed to produce a body of knowledge which would enable such improvements, assuming they are possible, to be planned and implemented. This perceived failure of user studies data to build theories for information science is, in his view, caused by the fact that they do not explicitly formulate their concepts and

assumptions and that the experiments are performed in an *ad hoc* and isolated manner. Thus, for Hjorland, the current state of both theory and methodology in user studies precludes the development of useful knowledge about how users behave. If this is the case then the already difficult task of building systems based on this knowledge appears even further from a successful implementation.

In terms of meaning, any approach which asserts the prominence of mental experience is limited by all the theoretical problems that this raises. The inner experience of meaning is an important aspect of meaning but it cannot explain it in isolation because the inner experience is, in itself, reliant on the external factors of the physical world and the social context. These are essential, for example, in explaining how meaning is used consistently. There is also the theoretical conflation of experience with explanation: referring to a mental event cannot explain meaning because we don't know what mental events are. There is also a practical or implementation problem about whether all this understanding of the experience of information would actually lead to the design of better information systems. Thus, although the cognitive tradition makes a useful critique of the more objective view, by arguing that information must include some kind of change in a person, rather than just in a physical medium (although, of course, a person is also a physical medium), it does not have the conceptual tools to really explain how this change happens and what it consists of. This process cannot be understood if meaning and information are understood primarily as something that happens in people's heads. In Wittgensteinian terms the cognitive tradition would certainly qualify as being in a philosophical muddle. It is not so much that it is incorrect in some details but rather that its assumptions about mental states do not really withstand analysis and tend to obscure theoretical clarity.

> "How does the philosophical problem about mental processes and states and about behaviourism arise? - The first step is the one that altogether escapes notice. We talk of processes and states and leave their nature undecided. Sometimes perhaps we shall know more about them - we think. But that is just what commits us to a particular way of looking at the matter, For we have a definite concept of what it means to learn to know a process better. (The decisive movement in the conjuring trick has been made, and it was the very

one that we thought was quite innocent.) - And now the analogy which was to make us understand our thoughts falls to pieces. So we have to deny the yet uncomprehended process in the yet unexplored medium. And now it looks as if we had denied mental processes. And naturally we don't want to deny them." (Wittgenstein, 1953, 308)

The cognitive tradition then, with its subjective emphasis, generally raises more questions than it answers about the nature of information and explanatory theories in IS. The nature of its central question "what is it like to be informed?" also tends to just lead to confusing analogies between mental experiences and information systems. As Ellis (1992a) observes the analogy at the centre of the cognitive tradition does not work as an analogy or a model because we just don't know enough about mental experiences. The next perspective under discussion attempts to move away from the subjective/objective division to propose a view of information that has a broader and more social view of the human subject.

4.4 Information as a social practice

So far this discussion has covered the nature of the subjective/objective divide and arguments about which aspect of it is of most relevance to information science. Broadly speaking the division between those that regard information as primarily subjective or primarily objective can be seen as closely related to the subjective/objective debate in meaning. Wittgenstein sought to subvert and overturn that debate by challenging its shared premise: the dichotomy between the subjective and the objective. Some more recent theories of information science have taken a similar approach and moved the debate away from the relative importance of the objective or quantitative *vis a vis* the subjective or qualitative by focusing on the social and collective aspects of information. The impetus for this new perspective is a dissatisfaction with the current state of theory within information science, a concern expressed by, among others, Hjorland (1997, 2000a, 2002) and Vakkari and Kuokkanen (1997). They argue that there has been a lack of progress in IS, though it is not entirely clear what the basis for this claim is, and that this is because IS has an inadequate theoretical base. IS is currently stuck in a false and unnecessary dichotomy between whether information is subjective or objective and it

needs to transcend this opposition if it is to grow. A theory that emphasises social practice is seen as a desirable thing because it would enable knowledge growth in IS. Thus, in terms of how IS may relate to the philosophy of meaning, this tradition has a strong emphasis on the question of the nature and purpose of theory building.

This social practice perspective critiques the rationale behind the subjective/objective divide that underlies both the subjective and objective perspectives on information. An alternative position is then provided which uses the pragmatics of social practice as one way of eliminating the need for the dichotomy. These views are analysed, mainly through the work of Hjorland (1997, 1998a, 2000a), in this section and an evaluation of how they progress our understanding of meaning within information science is provided.

Hjorland takes as his starting point the perceived problem of the current lack of theory in information science. Following Vakkari and and Kuokkannen (1997) he claims that this lack consists of the absence of an explicit formation of concepts and their relations. He also claims that theory (1998a) should have two strands: from a scientific perspective it should be about explanation, from a philosophical perspective it should be about uncovering hidden assumptions. In terms of the scientific perspective, a theory in IS needs to be able to explain, for example, user behaviour or the function of different search elements such as descriptors, titles, etc. (1998a, p.607). The philosophical perspective should work to reveal the hidden philosophical assumptions lying behind current approaches within information science. Philosophy is seen as operating on a meta-theoretical level with assumptions that are more general and less specific than theories. He defines this level as the "more or less conscious assumptions behind theoretical, empirical and practical work" (1998a, p.607) and argues that these assumptions are connected to philosophical views. The two main meta-theoretical approaches in IS are taken to be, following Vakkari and Kuokannen (1997), the physical paradigm and the cognitive approach, and both of these make certain assumptions about the nature of meaning, information and cognition which are often not clearly articulated. In Hjorland's view, then, information science has a major problem in terms of its lack of theoretical development. This problem has two levels: firstly a lack of satisfactory

explanations, and secondly a failure to acknowledge the philosophical perspectives lying behind much of its research. These failures make it difficult to develop knowledge in the field and are part of the cause of its unclear remit. Hjorland (2000a) also argues that the reason that information is seen as having an unclear meaning is because the meaning of a scientific concept is always determined by theoretical assumptions and within information science these assumptions are not clear. Thus in one sense his appeal to social practice has Wittgensteinian overtones but his argument that the meaning of scientific concepts is based on assumptions seems very different from Wittgenstein's views on meaning as use and context. Before proceeding with a more detailed analysis of Hjorland's work the exact nature of his theoretical or meta-theoretical project will first be investigated. Is he correct about the theoretical lack in information science and does this distinction between theory and meta-theory offer a coherent proposal to address the claimed deficit? There does appear to be a fairly widespread perception (Ford, 2000; Ellis, 1996; Marcella *et al.,* 2002) that theory growth in information science has been disappointing. In IS there is often not a clear rationale as to why many empirical investigations are carried out and the data collected often fails to provide conclusive answers to what were inadequately formulated questions. Thus, in terms of explanation there does appear to be what could be called a 'why deficit' and in terms of relating this to a theoretical structure there does seem to be a problem with knowledge growth. This concern, however, is not in fact shared by many of those that work in more technical areas of information science, such as information retrieval. Thus it may be true but it is not "a truth universally acknowledged". Most participants in the TREC (Sparck Jones, 2000) experiments, for example, do not concern themselves with theory but with practical results. Regardless of the extent of the perceived problems, however, it does seem very important to some sections of the IS research tradition and thus the question of the nature of this theoretical lack or 'why deficit' is worth pursuing.

Hjorland is proposing two difficulties. Firstly he claims that there is a failure of explanation. This raises the question of what exactly is meant by an explanation. On a simple level an explanation is an account which satisfactorily answers the question of why a certain action had a certain effect. As discussed in the previous chapter in a

scientific sense this would normally be taken to mean some kind of reference to how an event fitted into scientific laws and theories (Harre, 2001). It would also include reference to how the superficial aspects of a phenomenon can be explained by aspects of its nature which are hidden to the casual observer. Hjorland (2000a) himself use the example of how a scientist studies cancer cells in order to understand and thus predict their behaviour as a model to which information scientists should aspire. Thus for an explanation to add anything to an observation it would appear that it needs to refer to hidden aspects of the phenomenon and describe how they fit into a structure of patterns about how that phenomenon behaves. This should make it possible to accurately predict their behaviour in certain conditions. Hjorland's view of explanation appears to be primarily scientific in this sense but there remains the question of whether this view of theory as explanation can fruitfully be applied to a discipline such as information science. He does not provide an argument to convince one that studying information is like studying cells, he just suggests that information science should adopt the scientist's approach. Science is, however, only partly determined by its methods, it is also determined by its content or subject matter and these have to be the kind of thing from which scientific methods can yield data which proves or disproves theories. The methods are a reflection of the content or the subject matter rather than *vice versa.* Thus I argue that Hjorland here uses an interesting analogy but he does not convincingly show that this analogy is, in fact, an appropriate model for the study of information.

Hjorland's second view of theory is meta-theory, which is more general and is defined as the broad assumptions which lie behind the different approaches in IS. In his view, these approaches are related to particular philosophical traditions. He argues that behind our activities are certain assumptions about the nature of the world, human beings, language, cognition, etc., and that these assumptions can and should be analysed. Thus the meta-theory element of information science operates at a philosophical level which means that it uncovers and analyses how these assumptions operate within information science. Philosophy is defined as the discipline that operates at the most general level of knowledge. Its concerns are divided between those of ontology or metaphysics (what exists) and those of epistemology (the nature of knowledge and how we acquire it). The

meta-theoretical aspect of Hjorland's work, then, appears to be a proposal to use philosophy, presumably at the level of conceptual analysis, to uncover the hidden assumptions behind information science and thus improve theoretical clarity by making explicit what is currently implicit. Thus, in terms of meaning this approach should be able to reveal the philosophical perspective on meaning, for example whether it is subjective or objective, that a particular tradition in information science is relying upon. It is similar to his theoretical approach in that it aims to reveal what is hidden, in this case not an explanation but a relationship to a particular philosophical perspective. He also, however, argues that philosophy can be used to analyse the substantial theories in IS, and indeed that IS can be understood as a kind of "applied epistemology" (1998a, p. 608).

Hjorland divides epistemology into empiricism (external experience), rationalism (internal cognition) and historicism (cultural social context). He defines epistemology in the broad sense as the philosophical study of knowledge and specific epistemologies as theories and approaches to knowledge.

"Epistemology can be seen as the generalisation and interpretation of collected scientific experience and interpretation of that experience, therefore theories of epistemology are the most fundamental theories of relevance, and, any theoretical assumption in IS is, in the end, based on epistemological assumptions. These are also linked to ontological assumptions concerning the object under study." (Hjorland, 2002, p.439)

Epistemology, however, as Cappurro (1992) observes, relies on the subjective/objective divide because it needs a gap between the knower and what is known. Hjorland is both theoretically rejecting the power of this divide but also relying on it to perform some of his own theoretical work. This process can be analysed in terms of the dialectical perspective, which is discussed in chapters 6 and 7. There is also a difficulty with the concept of applied epistemology mainly in terms of "as opposed to what?". Wittgenstein argues that all knowing is applied in that knowledge can only be understood as a practice and not an abstract edifice. Hjorland is therefore taking what appears to be a broadly Wittgensteinian approach but simultaneously relying on an abstract view of knowledge.

Floridi (2002) argues that social epistemology (SE) is an inappropriate theoretical framework for LIS (library and information science) because of the important differences between knowledge and information.

> "SE and LIS do not make a happy marriage because LIS works at a more fundamental level than epistemology. Its object is not knowledge itself but the information sources that make it possible, even if only indirectly." (Floridi, 2002, p. 41)

Thus, for Floridi, LIS should be understood as a much broader question than that of knowledge. Unlike epistemology, it is not too much concerned about what our justifications for knowledge should be, and it is concerned with many information sources which are not strictly to do with knowledge "from children's books to ancient astrological maps, from digital office records to sports videos" (p.40). There is therefore, at least a philosophical question mark over Hjorland's emphasis on the importance of epistemology in IS.

Hjorland argues that it is possible to analyse information science in terms of its theoretical positions. Thus there is a relationship, often unacknowledged, between theoretical assumptions and research and practice. Classification methods, for example, can be seen as a reflection of epistemological positions. He argues that bibliometric linking can be seen as an expression of the empirical perspective, facets or logical division as an expression of the rationalist tradition, and the selection of classifications which support particular activities as pragmatism (1997, p.42). Thus the application of epistemology in this case seems to mean the use of conceptual analysis to reveal the philosophical position which lies behind particular activities in information science.

He also makes the distinction between models and theories (Hjorland, 2000a) which seems to echo the theory/meta-theory distinction. He critiques the use of models in IS as opposed to theories because models can't be falsified and thus they cannot expand knowledge. It is not possible for a model to be disproved by empirical work because it is normally held as an assumption rather than as an hypothesis under examination. Thus

there appears to be a distinction between the role of theory as a perspective and the role of theory as providing explanation in his work. He claims his aim in information science is not to look for scientific laws but rather for general principles (1997, p.16) in reply to Schwartz's (1992, p.129) assertion that a belief in the existence of scientific laws concerning information seeking is a great myth of IS. In my view there is room for more clarity in Hjorland's proposals here and a clearer definition of philosophy's role. In one sense it is seen as a background to be revealed but occasionally it is also called to do the work of explanation. Hjorland (1998a, p.608) argues that "philosophy can not only be used to analyse the meta-theoretical issues in IS but also substantial theories in IS." It is possible that these two approaches undermine each other, or at least that their relationship may be problematic, and this could reduce the clarity and coherence of his philosophical position. Wittgenstein argued that the confusion of empirical and conceptual questions was seen as the major cause of philosophical confusion. The role of philosophy was to untangle these confusions, not add to them.

This analysis will now proceed to examine the more specific nature of Hjorland's work and his arguments about how his theoretical view on information science should shape its theoretical structure, research methodology and professional practice. Firstly his views on the nature of information and knowledge are explained. The implications of this for information seeking are then explored. Finally the role that his understanding should play in the representation of documents and their subjects is discussed. This broadly follows Hjorland's views that a theoretical understanding of the nature of information will make it possible to better understand information seeking which in turn can assist in revealing the best ways to represent the subjects of documents. His basic theoretical position is constructed from both activity theory and domain analysis. Activity theory is defined as an approach that regards an organism in relation to its environment. This means that the subject of a document is neither an inherent characteristic nor a subjective experience. It is an interpretation; it is limited, however, by an individual's background and the context of collective scientific understanding. He cites Quine's semantic holism, the view that the meaning of any one symbol must be understood in the context of the whole system of representation, in support of this perspective. Quines's holism, however, is mainly at an

abstract level; it is, as Hjorland describes, a system of representation. Wittgenstein can also be seen as holist but for him the system was not an abstract edifice but our shared form of life. These are actually very different theories and the possible relationship between them is not fully articulated by Hjorland. His theory of domain analysis (Hjorland, 1997), however, seems to emphasise the social practice elements of this shared system.

> "The domain analytic paradigm is a theoretical approach to IS which states that the best way to understand information in IS is to study the knowledge domains as discourse communities, which are part of society's division of labour." (Hjorland, 1997, p.106)

He argues that documents should be interpreted in relation to the knowledge interests of a given information system. This means the representation of documents should be investigated in particular domain or groups rather than at a general universal level.

> "One cannot treat all domains as if they are fundamentally similar, and a theoretical approach to LIS (library and information science) should consider different discourse communities." (Hjorland, 2002, p.422)

A discourse community is a group with certain shared practices and therefore, according to Hjorland, certain shared use of terminology and meaning. Concepts can mean different things in different circumstances and therefore information science needs to establish subject specific terminology. This analysis now proceeds to examine in more detail specific aspects of Hjorland's work.

4.4.1   Information and knowledge

Hjorland argues that information should not be seen as a permanent feature of knowledge. The extent to which knowledge is, in fact, informative, will depend on a number of situational, pragmatic and domain specific factors and principles.

"My conclusion of this section is that information is not a thing, but that *all* things can be informative-to a greater or lesser degree, and always only from the point of view of specific situations." (Hjorland, 2000b, p.35)

He also argues that it is not possible to have an objective or neutral definition of information. Any definition of information must "be based on a particular theoretical perspective" (1997, p.110). Indeed all theories and approaches about the nature of information arise from allegiances to particular views on the nature of cognition, meaning, language and knowledge. Information science needs to jettison any goal of developing a universal theory of knowledge. Instead, it needs to study the different criteria for knowledge in different areas and the use to which it is put. The activity theory of subject matter argues that meaning is not in the mind of the user, or present in fixed abstract ideas, but in our social practice. Individual knowledge can only be understood in the context of a collective analysis of the knowledge and language use of the collective group. Thus, in his view "concepts are not universal phenomena linked to the brain but are shaped in specific social activities and internalised during learning" (Hjorland, 1998a, p. 615).

This approach emphasises the importance of understanding information and knowledge in use as opposed to seeing them as abstract entities. His research paradigm is defined as domain analytic which seeks to understand information by studying the knowledge domains of particular knowledge communities which he argues are part of society's division of labour. Here we can see a similarity to Putnam's arguments that the establishment and maintenance of meaning works through a social division of labour. Hjorland argues that information science should be looking for the differences, not the similarities, between these communities (1997, p.126; 2002, p.422). Each scholarly and professional domain has a unique structure of documentation, which is a reflection of their patterns of communications and publications. These structures should be understood as part of an adaptation to the needs of the special domains. Thus the activities of a domain shapes its knowledge structure, this knowledge structure shapes its

communication and publications structure which in turn shapes its traditions of documentation.

He argues that if information science is to survive as a distinct discipline, it needs to develop a domain analysis which contains general, concrete, and specific perspectives (Hjorland, 1997). It needs to be general in the sense that it can generalise from its particular perspectives and it needs to be concrete in that it builds upon the physical characteristics of phenomena. It also needs to be specific in order to distinguish it from already existing sciences. This appears to be a rather contradictory set of requirements. The exact nature of the conflicting demands made upon theories of meaning, and thus of IS and IR, are discussed using the dialectical model in chapters 6 and 7.

4.4.2 Information seeking

Hjorland's views on information seeking have two major themes. Firstly he stresses the importance of the purpose for which the information is required and the role of the particular community in which the information seeking takes place. Secondly he emphasises the importance of acknowledging theoretical perspectives in information seeking behaviour and argues that a user's behaviour will be influenced by his or her theoretical assumptions. What, however, is the relationship between these two proposed aspects of information seeking?

Hjorland's argument appears to be that it is the particular discourse community, and its shared activities, which provides the environment in which this link can be developed. Thus it is a Wittgensteinian approach in so far as any perceived gap between inner process and external action is rendered irrelevant by an observation of our shared social practice. His domain analytic perspective interprets information seeking (1997, p.137) as stages in a co-operation process between producers and users of knowledge within the framework of disciplines or discourse communities. Human knowledge is object orientated, and it is the object of the enquiry (what it is about) that determines the line of development. Knowledge does not independently develop in the mind of the user (1997, p.172) rather individual knowledge development should be understood as a gradual

approach to the level of collective knowledge in one's field. Collective knowledge development is characterised by a more and more detailed description of the object.

In Hjorland's view information seeking should be seen as the key problem in information science and the problem of representing the subject of documents is secondary to this. Thus the question of how to represent the meaning of documents should be understood from the perspective of how those documents are going to be searched for. Research in this area, in his view, has so far focussed either too much on the subjective within the cognitive tradition or too much on the objective within the empirical tradition. In examining this problem he claims that subject representation is neither subjective nor objective. His alternative theoretical framework is activity theory. This approach claims that the subject of a document is the epistemological potential of that document. It is not an inherent characteristic nor is it something subjective for an individual user. Thus meaning cannot be understood just as a mental event in a user's head and it can also not be understood as something fixed and inevitable about the object it describes. Individual knowledge structures do exist but they can only be understood from the collective analysis of language users. Meaning is not at the mercy of endless interpretation because the current state of scientific knowledge acts as a background for individual interpretation. The normative aspect of meaning is provided by scientific knowledge because this provides limits as to what can count as a valid interpretation. He argues that it is essential to be normative about subject representation. One should aim for the optimal representation rather than just relying on the user's perspective. The most important question is not user-friendliness but subject representation.

In terms of subject representation he argues that it should be understood as assessing the informative potential of a document. This potentiality is not an idea but an objective reality. The better the descriptors predicts the potential of the document the more correct and also the more objective is the description of its subject. At the same time it cannot be understood in an abstract way at a distance from practice. The most effective subject descriptions occur within the context of a particular knowledge system. There needs to be a distinction between representing documents for general purposes (general science), the

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applied sciences and for *ad hoc* purposes. Different human activities, including the different sciences, can be understood as different perspectives on the same phenomenon. It is not clear why he just uses science to illustrate his point here. He does proceed to broaden his argument by discussing how, within academic life different disciplines study the same phenomena from different perspectives. The family, for example, can be studied from a sociological, psychological or economic perspective. Thus the answer to the question "what does this document mean?" should acknowledge that it depends on its intended audience and the use they are likely to make of it. At the same time, it is not completely dependent on this. It is limited by the current state of objective scientific knowledge and is therefore not at the mercy of potentially limitless interpretation. Knowledge then, for Hjorland, is the normative framework that limits the possible interpretations of meaning.

He criticises most user studies (Hjorland, 2002) for a lack of theoretical depth. He claims that the inadequacy of theory is the reason why we still have no explanation of why users acquire knowledge. Indeed he argues that the question of what information is needed to solve a given problem is not primarily a psychological question but a theoretical/philosophical one. His argument here is that the user may not know and/or recognise the information they need so that an examination of their subjective experience should not provide a basis for how to design information systems.

> "Empirical user studies have also often been built on the assumption that we as information specialists can learn what we need to know about information from users. However, information specialists should be the experts in information organisation and searching, we cannot expect to learn our profession by studying the behaviour of non-professionals. The tendency to try and measure users' information needs by questioning them or by studying their behaviour seems to me to be mistaken. What information is needed to solve a given problem is not primarily a psychological question but a theoretical/philosophical one." (Hjorland, 2002, p. 431)

He proposes that user studies should be interpreted through theories of knowledge and information. An understanding of the objective aspects, rather than just the subjective experience, of information is also required.

Thus, as well as emphasising the importance of social and pragmatic context to information seeking, he also argues for an acknowledgement of the abstract and the theoretical. Information needs are also connected to needs on a higher theoretical level. In order to understand them it is necessary to examine the nature of the relationship between general perspective and specific information need (Hjorland, 1997, p.161). The concept of uncertainty also needs to be incorporated, information seeking is not a cumulative process as one piece of information can disturb the whole process that started that need. It is not, clear, however, in my view, that the nature of these relationships and processes is really adequately explored by Hjorland, even though he does acknowledge that they are both important and problematic.

4.4.3 The nature of a subject and its representation

Hjorland argues that the subject analysis of documents is a fundamental activity of information science and that it should be seen a part of the social knowledge structure of particular groups or domains. In his view the foundation of information science "lies in documents and structures in between documents, where documents are regarded in their functionality as information sources to user groups" (1997, p.25). He defines the subject of a document as the answers it could provide to a user. In his view this could be an infinite number of epistemological possibilities, which does seem to contradict his views on the importance of science as a framework for limiting interpretations. He argues against traditional information retrieval, which he calls objective classification, and also the cognitive approach, which he calls individualistic subjective classification, and proposes an alternative, which is the socio-epistemological approach. This should provide the mechanism to include both the objective and the subjective: a general classification on one level and also ones that are suitable for particular groups. A document has several epistemological potentialities that are given priority based on disciplinary viewpoints (1997, p.22). This raises the question of what exactly is meant by a viewpoint. It is not clear whether it should be understood as an abstract entity or as some kind of potential for

action which is actualised in particular behaviours. Their nature is important because he argues that one of the most basic problems in information science is the question of how to measure the informational value of different subject access points in databases (1997, p.25). These could be seen as different perspectives or viewpoints on the same information but what exactly do they consist of?

He also proposes the development of a theory of documents based on studies about how their different elements contribute to meaning and how they effect each other (Hjorland, 1998a). Thus his holist and social view of meaning is extended to the world of documents. It is not just a question of how the meaning of documents interacts with the context of their use; it is also question of how their parts interact with each other and with other documents. He argues for an analysis between primary, secondary, and tertiary documents (1998a, p.616). Primary documents are defined as, for example, scholarly monographs and scientific articles; secondary documents as, for example, electronic databases like MEDline, Scisearch and OPACs; and tertiary documents as, for example, encyclopaedias and review articles. He also suggests analysis of the way documents vary in different domains (e.g. music has sheet music, geography has maps). In line with his views on the importance of theoretical perspective he also proposes investigation into how documents depend on epistemological assumptions.

4.4.4   Social practice as a solution?

Hjorland's work is in many ways Wittgensteinian in its perspective on meaning. He acknowledges the role of social and cultural practice in developing meaning and attempts to move away from some of the impasses caused by the division between the subjective and the objective traditions. Indeed he is essentially arguing that the current stagnation, as he perceives it in information science, is caused by a failure to acknowledge and move beyond these historical philosophical positions. He also refers to Putnam in his work in terms of his ideas about meaning operating as an aspect of the division of labour in society. It is not necessary for everyone to fully understand the meaning of every term, as long as some experts know then this will function adequately to maintain meaning. Indeed Hjorland's work places great emphasis on the authoritative expert of knowledge

in particular areas and this would appear to be his vision for the role of information scientists.

There are, however, a few difficulties with Hjorland's use of philosophy. He argues that Wittgenstein's concept of language games are about specialist groups whilst Wittgenstein (1953, 23) actually uses them more to describe the form of language, such as arguing, naming, and so on, rather than their use by a particular group. Wittgenstein also says that the term 'language game' describes both general and shared social context and also the specific use of language in a particular way. It is, in many ways, a paradoxical or dialectical concept.

Thus it is perfectly valid to use the concept of language games to explore the rules and context that surround and support particular instances of meaning but they cannot really be used, without substantial qualification, to completely explain how meaning differs between different groups. Indeed part of the problem that Wittgenstein is grappling with is the fact the meaning both does and does not vary between different groups of people. In what sense are we all the same in our use of meaning and in what sense are we different? Hjorland claims to be a semantic holist; this would normally, however, imply an acknowledgement of the whole human group rather than just small sub groups. There is also the issue that we tend to belong to multiple, overlapping, and indeed, in some cases, conflicting groups. All these issues raise the difficulty of how our general and shared understanding of meaning relates to specific instances of it in particular situations and Hjorland does not really tackle this nature of the relationship between general and specific in enough depth. His argument is that information science needs to build general theories of knowledge and also theories of how knowledge works in particular domains (specialist sub-languages) but the difficulties of incorporating both these aspects in one theoretical framework are not really addressed. He also does not acknowledge that Wittgenstein is discussing spoken language, and that information science, in nearly all cases, is dealing with recorded language in whatever form. Thus meaning in information science is always out of context or away from the original home (1953,116) of its own language game in the Wittgensteinian sense.

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His emphasis on epistemology also sits rather uneasily within his Wittgensteinian framework. Epistemology would seem to rely on some kind of gap between the knower and what is known and the subsequent generation of theories as to how this gap can or perhaps cannot be bridged. In Wittgensteinian terms we only think epistemology is important because, due to our confusion about the nature of meaning, we are still stuck with the idea that there must be a subjective/objective divide. We fail to see that, in most cases, our knowledge is simply part of how we act rather than something 'out there' that is beyond our reach. Wittgenstein could, of course, be mistaken about this and certainly, given that Hjorland is discussing recorded knowledge rather than our immediate sense of what we know, Wittgenstein's views may not even apply in this case. This issue, is however, not raised by Hjorland so it is difficult to ascertain how exactly it may fit into his work.

There is also a difficulty on a more general or theoretical level. As discussed previously, Hjorland's project can be split into two strands: the meta-theoretical and the theoretical. It would appear that the most fruitful results have come from the meta-theoretical approach. This has a clear purpose: the uncovering of philosophical assumptions and the conceptual analysis of important questions in information science. It reveals how different perspectives on meaning, often not made explicit, have distorted the focus of information science into narrow and misguided divisions. In my view his more specific approach does not share the same level of clarity of purpose. His theories are meant to be able to explain but it is not entirely clear what this means. His work draws heavily on the status of science but his own proposed theories, for example on the role of document structure in meaning, would not generally be seen as scientific theories. It is not clear, for example, that they could be conclusively falsified in a way that would ensure reliable knowledge development. In general the distinction between the scientific approach and the philosophical approach can become blurred and there is not enough discussion of the relationship between them. The assumption appears to be that they can be used together but this view is not acknowledged or defended. I would argue that it is possible for them to work together if the distinction between them is rigorously articulated and maintained.

In Hjorland's work the distinction is inadequately formulated which results in the kind of conflation of empirical and conceptual questions that Wittgenstein so deplored. A scientific theory is very different from a philosophical theory and this distinction needs to be fully addressed if theoretical clarity in information science is to be improved.

There are number of other potentially contradictory elements to his work. He emphasises the importance of theoretical perspective and also the importance of the pragmatic and particular social context. There remains the very interesting question about the nature of the relationship between these two factors. In his work on information seeking he emphasises the importance of activity and objectives but then defines information science by its content, rather than by its tools or technology Hjorland (2000a). The relationship between content, purpose and tools is surely central to understanding information science but this is not dealt with in depth. In terms of meaning these distinctions run throughout both theories based on reference and theories based on social practice. Hjorland, however, argues that information science must be understood independently of its tools but this seems rather close to trying to understand IS in isolation from how it is used. This then seems in direct opposition to his views about the importance of social practice and use in meaning. Contradictions within theories or approaches are not destructive to clarity as long as they are acknowledged and discussed. This deficit in acknowledging the role of conflict in theories is part of the impetus for the dialectical model.

Thus I would argue that Hjorland's work on meaning within information science has many insightful and interesting contributions to make but that these are not adequately combined into a coherent framework. The actual difficulty is not the lack of such a framework *per se* but the fact the its problematic nature is not addressed. The question of what it means to develop a theory of meaning and/or information is very complex. This is because of the difficult relationships they contain. The nature of these relationships needs to be acknowledged and, in my view, Hjorland does not sufficiently address this issue. It is not clear, for example, how his specific proposals for information science research fit into his general abstract theoretical project or whether his enthusiasm for the explanations of science may contradict his reliance on Wittgenstein. In my view many of his

arguments about the subjective and objective aspects of meaning and information are correct. The weakness is in the discussion about the nature of the relationship between them and the effects that this has in IS.

4.5 Conclusions

This chapter has discussed the role of meaning within information science. The role of the subjective/objective divide and its relevance to information science was discussed with an analysis of the various perspectives within information science and their respective approaches to the fundamental questions of meaning.

At the close of this analysis a number of issues have become clearer. Firstly meaning is a very important aspect of information science and many of the issues raised by a discussion on the nature of meaning can contribute to a discussion on the nature of information science. This is the case both on the most abstract or general level, such as the question of defining information science or discussing the potential nature of its theoretical development, and also at the most immediate or specific level in terms of deciding the optimal way to represent a document or create a query. The questions that concern meaning are, amongst others: the nature of the internal experience of meaning with an external reality; the way in which meaning is normative and remains consistent; the problem of developing a theory of meaning. These questions are also central to information science. All these issues are manifestations of the subjective/objective divide within meaning and this discussion has highlighted some of the ways in which this is the case.

There, remains, however, the difficulty of how these different aspects of meaning work together and how this all relates to information. This question is very clearly raised in the particular area of IS known as information retrieval (IR), the aim of which is to represent meaning in order to provide information, and this is discussed in the next chapter.

5 Meaning in information retrieval

So far in this thesis it has been argued that meaning exists in a tension between subjectivity (intension) and objectivity (extension). The previous two chapters have examined how this tension manifests itself in the field of information science. This chapter analyses how meaning operates in a particular area of information science known as information retrieval (IR). Ingwersen (1992) and more recently Hjorland (1997) argue that IR is the central research problem in information science. IR concerns itself with the problem of how to represent documents in a way which optimises their chances of being retrieved by users who would find them relevant. The success of these methods of document representation is normally measured by recall and precision. Recall is a measure of how many of the relevant documents in the collection were retrieved and precision is a measure of how many of the documents, which were retrieved, were actually relevant. In IR there is normally a tension between these two factors: as recall goes up precision tends to go down, and vice versa. This chapter begins with a discussion on the problem of defining information retrieval and the extent to which it is, or is not, considered to be related to the problem of meaning. It then proceeds to analyse the nature of two of the major research problems in IR, as identified by Blair (1990): representing meaning and developing a theoretical framework.

Before proceeding with this discussion it is important to note that the terminology which IR uses to examine meaning is often different from the terminology which is used in philosophy. The intension/extension distinction, which has characterised our discussion of meaning so far, is commonly used in philosophical discussions about meaning. This intension/extension distinction is normally understood as part of the subjective/objective divide. The philosophical problem is then to explain how these two apparently diametrically opposed aspects of meaning can have a relationship. This divide exists in IR between the user's information need and query (which can be understood as intension) and the document representations within the IR system (which can be understood as extension). Research in IR tends to either focus on the former, in the cognitive or subjective tradition, or on the latter in the objective tradition. Thus the divide between

intension and extension can be seen in the broad division that exists (Ellis, 1996) between the objective and subjective research divisions. It is also common, however, when discussing the nature of meaning, for IR to use the linguistic terminology of syntax, semantics and pragmatics, as used by Blair (1990). Ellis (1996), when discussing natural language processing makes the slightly more detailed distinction between the lexical level, the syntactic level, the semantic level and the discourse level. The lexical level operates at the level of single words, the syntactic level is concerned with their grammatical structure and type, semantics is normally taken to be 'aboutness' and thus can refer either to a subjective mental experience of an objective fact, discourse or pragmatics is the social context of meaning, or in Wittgensteinian terms the form of life or language game in which the meaning is used. Within IR the semantic and pragmatic levels are given the status of meaning whilst the lexical and syntactic levels are normally seen as being at a lower and simpler level. Ascertaining and manipulating the relationship between the lexical and syntactic levels of meaning, which, in increasing order of difficulty, are fairly amenable to computational analysis, and the semantic and pragmatic levels of meaning, which are very difficult to quantify, is one of the fundamental research problems in IR.

How do these levels of meaning, as discussed in IR, relate to the intension/extension divide, as discussed in philosophy? Semantics relates fairly clearly to the philosophical discussion on whether meaning or semantics is intension or extension. Semantics can be understood as discussion about how meaning can be about something, and this something can be either subjective or objective. In IR there is disagreement about whether research should focus on semantics as a subjective experience and analyse whether the document does actually affect the mental state of the user (Ingwersen, 1992), or on semantics as objective aboutness and concentrate on the subject matter of the document (van Rijsbergen, 1979). Pragmatics in IR is similar to the social practice tradition in philosophy in that it focuses on social practice as a means to reduce the power of the perceived division between the subjective and the objective. Discussion on the details of lexical issues and syntax, with the exception of discussion about the languages of logic (Russell, 1919; Strawson, 1950) is less common in philosophy, which normally concerns

itself with meaning in a broader sense than just text. IR, because it deals with recorded meaning, even voice retrieval is not the immediate spoken word, has to concern itself with how the details of text may relate to the semantics and pragmatics of meaning. One other important distinction between the linguistic terminology of IR and philosophical terminology is that the levels of meaning in IR, although clearly different in nature, are not often understood as being in conflict. Within philosophy, however, intension and extension are normally understood as having contradictory qualities that somehow need to be resolved if meaning is to be understood. One of my arguments in this thesis is that IR could learn from philosophy's insights into the paradoxical and contradictory nature of meaning.

5.1 Defining information retrieval (IR)

IR is not a clearly defined discipline. Blair (1990) argues that IR's difficulties are partly because it has no clear view of its central questions.

> "IR is a difficult area in which to work because it is often unclear what the fundamental issues or problems in the field are. It's not so much a question of finding the right answers but, even more fundamentally asking the right questions." (Blair, 1990, p.1)

IR, in a similar way to information science, is broadly divided between two main research traditions; the objective or physical tradition (van Rijsbergen, 1979; Salton and McGill, 1983) and the subjective or cognitive tradition (Ingwersen 1992). Thus, although most researchers in IR agree that IR is about storing and representing information in a way which facilitates its retrieval, they often disagree about what should count as information, how it should be represented, and how to measure whether it has been effectively retrieved. In one of the classical textbooks of the field Salton and McGill (1983) define IR as follows.

> "Information retrieval (IR) is concerned with the representation, storage, organisation, and accessing of information items. In principle, no restriction is placed on the type of item handled in information retrieval. In actuality, many of the items found in ordinary retrieval systems are characterised by an emphasis on narrative information. Such narrative

information must be analysed to determine the information content and to assess the role each item may play in satisfying the information needs of the users." (Salton and McGill, 1983, pp.1-2)

The components of an IR system are defined as a relationship between documents and queries.

"Every information retrieval system can be described as consisting of a set of similar items (DOCS), a set of requests (REQ), and some mechanism (SIMILAR) for determining which, if any, of the information items meets the requirements of the requests." (Salton and McGill, 1983, p.10)

Ingwersen (1992), coming from the more subjective tradition, defines IR in a very similar way. His research approach is very different from the traditional model assumed in Salton and McGill's textbook but his actual definition is not very different. The possibility that people can use the same word to mean different things is a recurrent problem area in IR. The ways in which meaning can be both the same and different will be discussed more in chapters 6 and 7.

"Information Retrieval is concerned with the processes involved in the representation, storage, searching and finding of information desired by the human user."
(Ingwersen, 1992, p.49)

He differs from Salton and McGill, however, in his view of the scope of an IR system. In his view it should include, not just the internal working of the system, but the effect or otherwise that it has on users. He argues that IR should be concerned with information rather than meaning because "information goes beyond meaning" (1992, p.25).

"IR, regardless at which level it is performed, is and is not intended to be satisfied with a semantically correct 'translation' of any text or picture. Retrieving meaning is not sufficient, or indeed perhaps not necessary in IR. IR is pre-occupied with providing information, which may act as a supplement to a human conscious or unconscious mental condition in a given situation." (Ingwersen, 1992, p.25)

Information, for Ingwersen, can primarily be understood as a change in someone's mental state or knowledge, and IR is about some of the processes that can make this change happen. If the information hasn't changed someone's knowledge state then it is not information. The more objective tradition within IR, as characterised by van Rijsbergen (1979), takes a different view of IR. Within this tradition the concern of IR is to provide a user with details of documents about his or her request. The question of whether or not they do actually inform the user is outside IR's remit.

> "An IR system does not inform (i.e. change the knowledge of) the user on the subject of his enquiry. It merely informs of the existence of (or not) and whereabouts of documents relating to his request." (van Rijsbergen, 1979, p.5)

Van Rijsbergen's argument appears to emphasise the objective semantics of meaning in IR. The document must relate to the user's request, which would normally indicate that they must share some meaning in the sense of textual content, i.e. they must be about the same or similar things. Thus in one sense it is more a question of document retrieval rather than, necessarily, information retrieval. Ingwersen, in contrast, is arguing that it is the usefulness of the document to the user, rather than its relationship to the meaning or content of his or her request, which is of central importance. Hjorland (2000a) argues that the term document actually implies something that informs. Thus, if a document retrieved is not pertinent then it is not really a document in that case. It is not the document's contents that are central; rather it is what the document does in a particular time and context. A document, in his view, is not just its text but also the effect that the text has. He argues that IR can be understood as document retrieval but a document must inform, i.e. it must also be information; document retrieval implies information retrieval.

In the contrast between Ingwersen and Hjorland's emphasis on use and van Rijsbergen's views on content, one can see a central dichotomy in IR. This dispute, as identified by Ingwersen (1992), is about the scope of IR: should it concern itself solely with how documents are processed within the IR system or should it extend its view to the uses of

the document and the context surrounding that system? IR is about documents or recorded information of some sort and it is also about how this information is found and used by people.

> "Today, information processing activities are carried out with the assistance of automatic equipment. Thus, a direct link exists between information retrieval and computer science. On the other hand, information retrieval also takes on aspects of behavioural science, since retrieval systems are designed to aid human activities." (Salton and McGill, 1983, pp. xi-xii.)

This tension in IR between processing information and the question of how that information is actually used can be seen as similar to the intension/extension division within meaning. In both cases there is an objective physical object: within IR a document, and within meaning an external object. This object, however, may not actually have meaning unless it is perceived and, according to some philosophers and information scientists, actually used. Information and meaning are both inextricably linked to the object that causes or facilitates them and also something over and above that object. The more objective tradition in IR focuses on the extension aspect of meaning whilst the more subjective approach demands that the attention is also given to its impact on intension. More recently, for example in the work of Hjorland (1997, 2002), there is an emphasis on the social practice aspects of meaning, or in linguistic terminology, the pragmatics of meaning. This work often draws on the work of Wittgenstein (Blair, 1990; Brier, 1996; Hjorland, 1998a) and argues for the importance of the use and context of information in terms of representing its meaning. Thus in IR the objective tradition argues that IR just needs to show that a relevant document exists, the subjective tradition argues that is it has to be perceived and understood, whilst the pragmatic approach argues that it also has to be used. This has a corresponding effect on approaches to meaning representation. The objective tradition focuses on textual analysis, the cognitive tradition on incorporating user perceptions, and the pragmatic tradition on incorporating potential uses or contexts of the documents.

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One useful way to develop understanding about the nature of IR and its relationship to information and meaning is to explore the ways in which IR is different from data retrieval. Most IR researchers may find it hard to agree on the exact nature of IR, normally because they have different views on information, but there is a general consensus that it is not data retrieval. This is interesting from a dialectical perspective because it reveals that IR can more easily be defined by its relationship to 'what it is not' rather than 'what it is'. Explaining the distinction between the two is used as an introduction to IR by van Rijsbergen (1979). In data retrieval the user is looking for an exact match. If, for example, they want to retrieve details of Fred Smith's salary from an employee database, they only want the single unique record that contains the necessary data. In IR, a user wants information about a topic rather than information to answer a specific query. Thus they want information which is about their query rather than identical to their query. In a data retrieval system one can be certain that, if a record matches a query, then it must be relevant. In IR, even if there are many matching terms between a query and a document, it still may not be about the query. There is always a degree of uncertainty about the relevance relationship between a document and a query. In data retrieval this relationship is deterministic, whilst in IR it is probabilistic.

There is also a distinction between how items are classified in these two kinds of systems. In data retrieval classification is normally monothectic, i.e. one with classes defined by objects possessing attributes both necessary and sufficient to belong to that class. In IR it is normally polythectic, i.e. objects can belong to a class even if they do not share all the attributes of that class: there is no attribute which is either necessary or sufficient to belong to that class. This distinction can be related to Wittgenstein's (1953, p.67) arguments about family resemblances between similar activities as opposed to a list of necessary and sufficient shared characteristics. In IR a document can be about a subject topic to varying degrees whilst in data retrieval an item will either be about the query or not.

The difference in content between data retrieval and IR systems is reflected in their different querying techniques. In data retrieval it is normally of an artificial kind with

specific rules of syntax and vocabulary (e.g. structured query language). In IR natural language is often used, though structured search languages do exist such as the Boolean query language. In data retrieval the query is normally a complete specification of what is required; in IR is it almost always incomplete, given the much more complex nature of the information need. This is because of the distinction between searching for an item which is an exact match and searching for an item which is relevant.

Blair (1990) also uses the distinction between data retrieval and IR to introduce the complex nature of IR. His emphasis is on the ways in which the contents and queries in IR systems contain indeterminacy and ambiguity and thus are open to different interpretations. In his view it is this indeterminacy which is the central feature of IR. He argues that there are only so many ways that one can ask for data but that there are endless ways in which one can ask for information. Data is structured and determinate whilst information normally is not.

> "The IR problem consists of matching ill-structured requests (with varying levels of indeterminacy in their descriptions) to ill-structured, similarly indeterminate, descriptions of available items or services." (Blair, 1990, p.319)

IR, then, is a much more complex and difficult problem than data retrieval because it concerns itself with meaning, and meaning is often open to different interpretations. There are numerous ways in which a document or an information need can be described and we can never be sure which way a particular indexer or user may have used it. In our normal spoken use of language, as Wittgenstein rigorously argues, meaning is actually not often a question of interpretation because our shared practices and social context serve to dramatically reduce ambiguity. It is clear what someone means because we share a particular time, context and situation with them. The difficulty in IR, as Buckland (1991) observes, is that the user and the indexer (manual or automatic) do not share either time or context.

> "In IR delay and indirectness are liable to exacerbate difficulties caused by problems of defineability." (Buckland, 1991, p.61)

Language then, can be ambiguous and open to different interpretation. In most cases, however, we have shared practices and contexts and these normally serve to make meaning clear. In IR these are not present because IR is about stored meaning which has been represented; meaning has been taken out of its home context and stored in an information system. This means problems of ambiguity and interpretation can be difficult to overcome because the tools that we normally use to tackle them are not at our disposal.

If humans represent the meaning of documents they can use representation terms and knowledge structures, such as classification systems, which can help reduce ambiguity. This is because humans are able to actually understand the content of the document. Thus although they are separate from the context in which the document was produced, which could lead to problems of interpretation, they can intellectually grasp that context and use this knowledge to anticipate how a user might search for the document. They have an advantage over automatic indexing in so far as the capacity for imagination, to draw connections and envisage events that are not actually happening at the time, is a useful one for deciphering meaning. This process can be complicated by the fact, however, that different indexers often have different perspectives and approaches resulting in inconsistencies in how documents are indexed (Salton and McGill, 1983). An automated indexing system may appear to avoid this problem but the disadvantage is that it can only deal with the data or text in the document and it cannot understand the meaning. Thus aspects of meaning which are not actually in the text cannot be used to help provide the correct interpretation of its meaning. In one sense the computer is still only doing data processing but, in IR, the user requires more than this. Developing computerised techniques that even approximate the human interpretation of meaning is very difficult. Automatic algorithms can relate the text in one document to the text in other documents but it cannot, in general, relate text to contexts and issues external to the text in the way that humans do.

> "Automatic characterisation in which the software attempts to duplicate the human process
> of 'reading' is a very sticky problem indeed. The difficulty is not only knowing how to
> extract the information but also how to use it to decide relevance."

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This discussion on the difficulty of defining IR reveals the complex and difficult role that meaning plays in this field. The debate about whether IR should concern itself only with meaning within the IR system or extend its remit to the user and his or her context is an echo of the intension/extension and social practice debate within the philosophy of meaning. Searle's (1984) arguments on computers and thinking, discussed in the philosophy chapter, reveal that, although IR relies on meaning it also relies on technology that cannot actually understand meaning. Meaning requires semantics and computers cannot understand semantics. Meaning is then both central and peripheral to IR. In terms of its users it is essential but in terms of its technology it is irrelevant. IR works fairly well because computers, even though they don't understand meaning, are able to process and manipulate text or recorded information in ways which can provide a good indication of their meaning. Improving this indication process and trying to make sense of it theoretically are very important and persistent problems in IR.

"The fundamental question of information/document retrieval to consider, then, is what is the basis for deciding how to represent documents in an IR system and, even more fundamentally, is there a theoretical foundation which can support document representation procedures." (Blair, 1990, p.122)

Van Rijsbergen (1979, p.8) argues that there are three main areas of research: content analysis; information structures; evaluation. Content analysis involves describing the contents of a document in a form suitable for computer processing, information structures refers to exploiting relationships between documents to improve performance, and evaluation is devising methods to measure retrieval effectiveness.

He is less convinced of the role that a theoretical understanding of language can play in improving meaning representation.

"Undoubtedly a theory of language will be of extreme importance to the development of intelligent IR systems. But, to date, no such theory has been sufficiently developed for it to

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be applied successfully to IR. In any case satisfactory, possibly even very good, document retrieval systems can be built without such a theory."

(van Rijsbergen, 1979, p.15)

His arguments on this issue have not been discredited by the passage of time. Sparck Jones's (2000) review of TREC, an annual large-scale text retrieval evaluation conference, concludes that document representation based on language processing, as opposed to more statistical methods, does not improve performance. She also, more recently (2004), argues that most of the IR systems used by the world wide web are still based on some of the early statistical models developed in IR.

There is then some disagreement in IR about what the main research questions should be. This thesis broadly accepts Blair's view that the main issues are meaning representation and theoretical development. This chapter does not discuss at length user issues and evaluation questions. This is because, in my view, both these issues are dependent on an understanding of meaning and an understanding of theoretical development. Once one has a better understanding of how meaning works and how theories about meaning operate, then problems such as a user's interpretation of information and the issue of relevance become clearer. Relevance can be seen as meaning from the perspective of the user and measuring it requires both an understanding of meaning and an understanding of how and if a theory of meaning can be tested. The problems with evaluation in IR are, in my view, a symptom of its lack of clarity about the nature of meaning and the nature of theory. Evaluation is discussed in chapter 7 on the dialectic model and IR because the debate in IR about evaluation is a revealing source of conceptual confusions. Examining the problem of testing and evaluation is an effective way of providing evidence of the often paradoxical nature of theory development and meaning representation. In order to provide a context for this, however, the issues of theory and meaning must firstly be clarified.

My approach is also aligned to Hjorland's (1997, 2003a, 2003b) arguments that IR problems are mainly conceptual and philosophical in nature and, until this theoretical

framework is improved, then data from experiments and users studies will have limited scope to develop knowledge. This chapter analyses the role that meaning plays in the problem of meaning representation and the problem of theoretical development in IR. The aim is firstly to reveal if an understanding of the philosophical debate about meaning can help clarify the nature of these questions. The purpose is also to identify weaknesses in the current level of understanding, particularly in the use of philosophy, as an introduction to the next two chapters which will analyse how the dialectical model can progress our understanding.

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5.2 Representing meaning

The discussion on meaning so far in this thesis has revealed its complex and often elusive nature. In dealing with text or documentation, and thus with meaning in at least one sense, IR is already dealing with a difficult subject matter. Understanding meaning becomes even more problematic in IR because nearly all IR systems require that meaning be represented in some way. This is normally the case both for the document and the queries and, even if full text is used, users still need to represent their information need as a query.

It is difficult to represent meaning and it is even more difficult to automate this process. In some way a decision has to be made about what are the most significant elements of the document as regards its meaning. This is a both crucial to IR and also very complex. Blair (1990) argues that little progress has really been made on this issue.

> "Most proposed retrieval algorithms presuppose reasonably good representations of documents, yet the limited work that has been done to test the effectiveness of document representation has shown that indeterminacy in the representations of documents is pervasive and significant and the indexing process as a whole is not well understood. Thus all work on IR presupposes a reasonably good practice or theory of document representation- something that we do not have." (Blair, 1990, p.vii)

Blair uses the term document representation rather than meaning representation and this in itself raises some interesting issues. Is representing the document the same as

representing the meaning of the document? To what extent is the meaning of the document what users will find helpful in determining its relevance? Answers to these questions often depend on what kind of thing meaning is taken to be. It can, for example, be seen as primarily content, or possible use or its relationship to other documents. Throughout these perspectives runs the relationship and, sometimes the tension, between accurately describing the meaning of the document in terms of its subject matter and also ensuring that the description can be processed by the IR system and be accessible to the user. There is both a tension and a relationship between how completely the document should be described and making it possible for the user to retrieve it.

As Buckland (1991, p.53), observes "all representation is more or less incomplete in some regard". Representation must be partial or it is not a representation; it must be both different from and related to that which it represents. Meaning representation is particularly difficult because a representation cannot include all the elements of meaning which we need in order to be confident that we have understood it correctly. The document is in itself reduced but even the complete document can provide only a partial view of its meaning. There are always things outside a document that will influence its meaning, which is one difficulty for meaning representation, and these things will also change through time, which is another difficulty. In philosophical terms an IR system can be said to have extension in one sense; the document can be pointed to. The relationship of this to the subjective intension of the user, the extension or topic of the document (what it is about) or the social context of the document can, however, remain unclear. This increases the problems of ambiguity, or possible multiple meanings, in language. A human indexer will normally be able to reduce this to an extent because they will have some understanding of the context, the author's intentions and the possible audience, but it can only be ameliorated. Representing meaning is, however, fundamentally problematic, even if it is done by humans. A representation is fixed but the ways in which a document could be used are very varied. In Buckland's terms a representation must be 'information as thing' but its relationship to 'information as process' and thus to 'information as knowledge' is hard to accurately predict. The problem is part of the divide and the relationship between the tangible and the intangible aspects of information.

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"The making of tangible representations of the intangible is of central importance for information systems." (Buckland, 1991, p.117)

Thus the representation of meaning is problematic on the theoretical and conceptual level; by its nature it involves some reduction of the document whilst at the same time it needs to avoid, as far as possible, reducing the meaning of the document. In IR this difficult problem needs to be tackled in practice and the next section looks at some of the ways in which it is approached.

5.2.1 Methods and concepts in meaning representation

The nature of document analysis, which Salton and McGill (1983, p.52) define as indexing will now be discussed and its limitations outlined. The purpose is to provide an overview of the issues and to examine how they relate to meaning, which then leads on to a discussion about how meaning representation can be automated. It will also provide a context to the more recent theoretical and philosophical work on the problem, which will be discussed in section 5.4. The central issue in meaning representation is reducing the size of the document but retaining its meaning.

"Of all the procedures used in a document processing environment, the most important and also the most difficult to carry out are the *analysis* operations consisting of the assignment to the bibliographic items of terms or identifiers capable of representing document content. In principle, a document analysis process is redundant if the document collection is small enough to permit the scanning of the full text of all items whenever a request for information is retrieved. In practice, such a solution is too time-consuming and too expensive. Hence it is customary to characterise each item by assigning a short description or profile, to the item which can then be used to obtain access whenever the item is wanted. In standard library environments, the analysis operations are known variously as cataloguing, classification, indexing and abstracting." (Salton and McGill, 1983, p.53)

This definition is now over twenty years old but it is interesting to note how the fundamentals of the problem have not changed too much. Full-text systems are no longer

either expensive in terms of storage or particularly time-consuming to search but this has not really solved the problem of retrieving documents. Even if full text is used there needs to be some way to assess the possible significance of terms.

What then is the purpose of the indexing process? In one sense it is a purely pragmatic process, done to reduce the amount of data the computer or the librarian/user needs to process before they can find a useful document. In another sense, it adds intellectual value because the selection of important terms can make it easier to find the document. A reduction in terms which do not carry much meaning, for example the stop word list, and the establishing of a document's relationship, either to other documents in automated indexing, or to a knowledge structure or classification scheme in human indexing, can all make it easier for the user. Indexing is then, in one sense a reduction, and in another sense an expansion of meaning. This is made more complex because the terminology of reduction and expansion seems to assume that meaning is quantitative and it is not clear that this is actually the case. Salton and McGill (1983, p.54) define the three related purposes of the indexing process.

" 1 To allow the location of items dealing with topics of interest to the user.

 2 To relate items to each other, and thus relate the topic areas, by identifying distinct items dealing with similar, or related, topic areas.

 3 To predict the relevance of individual information items to specific information requirements through the use of index terms with well defined scope and meaning."

All these purposes are concerned with meaning in different ways. Within this broad context there are a number of different approaches to undertaking this process and these will now be discussed. One of the major distinctions in practices of indexing is whether it is done by humans (often called manual or intellectual indexing) or automatically by a computer (often called automatic indexing) (Salton and McGill, p.54). In manual indexing a person, normally a subject specialist, reads the document and decides on the best terms to represent its meaning, whereas in automatic indexing a computer processes

the text and selects terms according to an algorithm. The algorithm is designed to select and weigh the significance of terms based on criteria such as term frequency or distribution throughout the collection.

A related distinction is the one between derived indexing and assigned indexing. Assigned indexing normally uses structures and concepts outside the document collection to impose structure on the document. This is often done by humans but it is also possible to have automatic assignments of terms from a controlled vocabulary such as a thesaurus. Thus the meaning of a document is represented by the way it fits into a particular indexing system. Assigned indexes tend to produce high recall, i.e. a lot of the relevant documents in the collection are retrieved. A derived index, in contrast, is based solely on the contents of the document and no use is made of external knowledge sources. They tend to produce high precision results, i.e. many of the documents retrieved are, in fact, relevant.

Assigned indexes use controlled indexing terms, while derived indexes use uncontrolled indexing terms because they only use what is already in the text rather than an external source. An uncontrolled indexing vocabulary, which contains the whole range of natural language, can lead to ambiguities and problems of interpretation. A limited indexing language is one in which the terms available for content identification are rigidly controlled. This eliminates synonyms by referring to unique accepted terms for each synonym class and by identifying semantically related terms. This means that if these terms are used in the query then appropriate documents will be retrieved. It is often, however, necessary for trained intermediaries to formulate the user's queries. If the search term is correct then relevant documents will be found but knowing the correct term can be a specialist skill.

Indexes can either use single terms or terms in context. In a single term system, the content identifiers, known as index terms, keywords, or descriptors, are used as individual words to describe the contents of the document. Each document is then represented by a collection of individual terms. These are combined or co-ordinated to

form topic descriptions only at the stage of query formulation. This process is known as post-coordination. In the case of terms in context, compound terms or phrases are used to represent the meaning of a document. This is called pre-coordination because the terms have been structured and ordered in advance of the search process. In most manual indexing environments a controlled indexing vocabulary is used which utilises pre-coordinated compound terms. Automatic indexing usually uses single terms because they are more amenable to analysis by computers. All these methods are bound by the two important parameters of any indexing environment: exhaustivity and specificity.

"Exhaustivity refers to the degree in which all concepts and notions included in the document are recognised in the index descriptions. The more exhaustive the indexing the higher may be the proportion of the relevant items that can be retrieved, because all the various aspects of the subject matter have then been properly recognised. Specificity, on the other hand, refers to the generic level of the index terms used to characterise the document content. If the indexing vocabulary is very specific, and if narrowly defined terms are assigned to the bibliographic items, a large proportion of the non relevant items may be properly rejected when the documents to be retrieved are determined." (Salton and McGill, 1983, p.55)

Another way of looking at exhaustivity and specificity is to see it as type of relationship between a document and its indexing terms.

"Exhaustivity can be assumed to be related to the number of index terms assigned to a certain document, and specificity related to the number of documents to which a given term is assigned in a given collection." (van Rijsbergen, 1979, p.24)

Cleverdon (1966), in some of the first IR experiments, argues that all indexing methods can be understood as devices for either increasing exhaustivity or increasing specificity. These parameters are reflected in the way in which the effectiveness of retrieval systems is normally measured, i.e. by using recall and precision.

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"Recall measures the proportion of relevant information actually retrieved in response to a search (that is the number of relevant items actually obtained divided by the total number of relevant items contained in the collection), whereas precision measures the proportion of retrieved items actually relevant (that is, the number of relevant items actually obtained divided by the total number of retrieved items)." (Salton and McGill, 1983, p.55)

In general as recall rises precision falls, and vice versa. It is not, however, an inverse relationship in the mathematical sense because there is not an exact or predictable relationship between the increase in one and the reduction of the other. This means that if recall is known to be at x there is not a way of calculating what precision will be. Precision should be understood as a decreasing function of recall, i.e. as recall goes up precision goes down or, as Luhn (1958) describes it, there is an inverse ratio relationship between recall and precision. The use of exhaustive indexing tends to lead to high recall and the use of specific indexing tends to lead to high precision. The tension between these two aspects of meaning representation is also manifested in the tension between representation and discrimination, as explained by van Rijsbergen (1979).

"There are two different ways of looking at the problem of characterising documents for retrieval. One is to characterise a document through a representation of its contents, regardless of the way in which other documents may be described, this might be called representation without discrimination. The other is to insist that in characterising a document one is discriminating it from all, or potentially all, other documents in the collection i.e. discrimination without representation."
(van Rijsbergen, 1979, p.29)

Van Risjbergen concludes "in practice one seeks some sort of optimal trade off between representation and discrimination" (1979, p.29). The seeking of optimal trade offs is a recurring and common theme in meaning representation. These exist on the conceptual and theoretical levels in the tension between exhaustivity and specificity and the related tension between recall and precision. They also exist on a pragmatic level in terms of time and resources spent representing documents versus the time spent looking for them. Careful and detailed manual indexing often does give good results but there remains the

question of whether this improvement is worth the extra time and effort involved. Meaning representation is difficult in both principle and practice. The next section looks at the problem of how to automate meaning representation and analyses the ways and extent to which computers can extract meaning from documents in ways which helps humans to retrieve relevant information.

5.2.2 Automatic meaning representation

So far we have seen that from a human perspective meaning is difficult and complex, and that representing meaning is even more difficult and complex. In IR, it can be even more problematic because of the requirement to automate the meaning representation process. A computer cannot understand the meaning in terms of the semantics or the pragmatics of a document; it can only process it at the lexical or syntactic level. The pragmatics or context of a document are normally capable of reducing ambiguities of meaning but this is not accessible to the computer. It can deal with items that tend to be fairly good indicators of meaning but it does not have the full picture. In Wittgensteinian terms the computer is not part of our form of life. There have been some attempts to use techniques from artificial intelligence (AI) in order to incorporate contextual information into IR systems but this, in a similar way to AI, does not really translate well out of limited domains (Smeaton, 1992; Ellis, 1996).

If a person finds it difficult to accurately represent the meaning of a document, with all their access to background knowledge and social context, then what chance does a computer have? The answer seems to be a surprisingly good one. Computers can't understand a text, which makes it more difficult for them to accurately capture the nuances of meaning. They can, however, process documents far quicker than humans do, so there is a reasonable trade off.

Since computers can't understand documents, algorithms have to be developed which use data that computers can process, such as term frequency and distribution, in order to deduce or approximate the meaning of a document. Computers can't deal with meaning like a human but they can recognise and process text. They can then process elements of meaning which provide a fairly good indication of meaning in the ways that humans

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understand it. This means that when a user comes to search for documents the terms selected by the computer to represent its meaning are normally reasonably appropriate. The difficulty for IR is that although automated indexing is reasonably effective it has proven a hard process to dramatically improve. It is often 'good enough' but still not that good.

This section will analyse some of the techniques of automatic indexing. The aim is to provide an overview of the issues rather than a detailed explanation of the technology. This then leads onto the next section that discusses those in IR who regard current automatic indexing techniques as unsatisfactory.

As discussed previously, in IR meaning is often understood as existing on four levels: lexical, syntactic, semantic and pragmatic. Automatic text analysis normally works at the lexical level by analysing the frequency and distribution of individual terms. In natural language processing (Smeaton, 1992) the grammatical structure of the text is also analysed. These systems can, for example, identify a noun phrase as a noun phrase rather than just a collection of individual terms. Thus they offer a more complex analysis of the content of the text. In terms of retrieval performance, however, the more complex natural language processing systems have not resulted in any significant improvement (Smeaton, 1992; Sparck Jones, 2000). The rationale behind both lexical and syntactic analysis is that they can provide an indication of the meaning of the text, and the assumption is that they have a relationship to the semantic level or what the document is about. The next question is whether the semantics of the document is actually pertinent on the pragmatic level. The document can be about the same subject matter as the query but it may still not be useful to the users in their particular situation. Automatic text analysis concerns itself mainly with the lexical and/or syntactic level relying on the, broadly correct, assumption that this will provide an indication of the semantic content.

One of the simplest and also very effective methods is based on using the frequency of term as an indicator of semantics.

"Most automatic indexing efforts start with the observation that the frequency of the occurrence of individual word types (that is of distinct words) in natural language texts has something to do with the importance of those words for content representation." (Salton and McGill, 1983, p.60)

In general, words that appear very frequently or very infrequently are not good indicators of content; it is medium frequency words that are most useful (Luhn, 1958). In the index these terms were given a high weight which signified their importance as meaning identifiers. A problem with the early methods using this approach was the way in which it used absolute frequency measures rather than ones relative to a specific collection. The information that term frequency supplies is dependent on the collection rather than having a universal value. In a computing science collection, for example, the term 'computer' would be frequent but it would not be a good indexing term for the following reason:

"A useful index term must fulfil a dual function: on the one hand, it must be related to the information content of the document so as to render the item retrievable then it is wanted (the recall function); on the other hand, a good index term also distinguishes the documents to which it is assigned from the remainder to prevent the indiscriminate retrieval of all items, whether wanted or not (the precision function)." (Salton and McGill, 1983, p.62)

Thus, in a computer science collection, the term 'computer' might represent the content but, as most documents, even if they were on very different aspects of computer science, would contain the term, it would not work well at distinguishing these documents from each other. In order to ameliorate this problem a relative frequency measure can be used to identify terms which occur frequently in some documents of the collection but relatively infrequently in the collection as a whole. This is technique is known as the inverse document frequency (Salton and McGill, 1983, p.63). It assumes that term importance is proportional to the standard occurrence frequency of each term in each document, and inversely proportional to the total number of documents to which each term is assigned.

Meaning representation at the lexical level, or level of individual terms, uses data that has been collected about how term frequency relates to semantics or meaning and uses that data to select terms and decide on their significance as content indicators. The computer does not understand the meaning of the documents but it is very adept at counting its terms and using algorithms to decide their likely significance. In most cases this lexical analysis does bear a relationship to the semantics of the documents and in most cases the semantics of a document does bear a relationship to whether it will be useful on a pragmatic level. These relatively simple methods generally work fairly well.

> "There seems to be mounting evidence that in both cases, manual and automatic indexing, adding complexity in the form of control more elaborate than index term weighting does not pay dividends." (van Rijsbergen, 1979, p.23)

More recently, Sparck Jones (2004) notes the continued predominance of statistical methods in IR. These methods, however, despite their general utility, failed to make any major breakthroughs and some more sophisticated methods of language analysis were tried in IR. These, normally known as natural language processing (NLP), analyse the text on a syntactic as well as a morphological level. Thus the text is not seen as simply a collection of individual terms but its grammatical structure, for example whether a term was a noun or a verb, is also acknowledged when devising a representation of its meaning.

In one sense this can be seen as an attempt to increase the amount of meaning in techniques of text representation. The term-based analysis methods have two major weaknesses which NLP works to resolve. The first weakness is the potential ambiguity in just using single terms. The order and structure of terms, as well as just the terms themselves, provide useful information about their meaning.

> " .. if accurate linguistic techniques were usable to combine single terms into meaningful larger units, then complete *structured index descriptions* might be generated consisting, for example, of noun-verb-noun combinations or of sentence units of even larger scope.

Substantial improvements in text analysis and hence in retrieval should result." (Salton and McGill, 1983, p.259)

The second major weakness in term-based indexing systems is that they cannot accurately group together synonyms or related terms.

"Under current conditions thesauruses are constructed manually, or automatically by using word co-occurrence information. However, if linguistic descriptions were available to characterise the individual text units, a thesaurus class might be defined as the set of words occurring in similar contexts in the documents of a collection."
(Salton and McGill, 1983, p.259)

If NLP succeeded in solving these problems then it would present a significant improvement on term-based methods. It uses more levels of meaning than term-retrieval methods and thus one would expect it to produce a fuller meaning representation and thereby better retrieval results. These anticipated improvements have, however, generally failed to materialise, at least in terms of TREC (Sparck Jones, 2000). Using information about syntactic structure in documents to help represent their meaning has not reliably improved the semantics of the representation.

"The big assumption made by those who use syntactic level NLP for any IR task is that the syntax or structure of the language is indicative of the semantics or meaning i.e. structure implies content. This is not always true." (Smeaton, 1992, p.274)

It appears to have a sounder theoretical base than term-based techniques in the sense that it utilises a fuller picture of meaning but this has not often translated into improved performance. Arampatzis *et al.* (1998, p.706), when discussing their own NLP research, conclude that "At this point in time, there is no conclusive evidence that NLP support can provide an important contribution to the quality of IR".

A question this raises, which is often pertinent to IR, is the extent to which this is a problem of technology which, over time, should improve, or a problem at a conceptual or

theoretical level, an incorrect understanding of the issue that, regardless of technology, will never be appropriate. Firstly, although some in IR are very dismissive of NLP, it is, for example, used with much more success in query analysis, for example with disambiguation (Allen and Raghaven, 2002) than it has been in document analysis (Sparck Jones, 2000). It may be that, in some of the more specific and limited aspects of IR such as queries, it has a potentially useful role to play.

In terms of meaning, however, it does not seem to have provided too much in terms of increased theoretical understanding; it is still not too clear why it either works or doesn't. The use of syntactic analysis in IR is often not based on a deep theoretical understanding but tends to be used on an *ad hoc* basis. Smeaton (1992) argues that NLP in IR is done purely at an empirical or pragmatic level and that a greater understanding of the issues is required before progress will be made.

 "It (NLP) is regarded as a black box or tool to help provide better or richer indexing by phrases instead of words, to provide good matching of phrases, etc. This role does not really address issues of retrieving information for users based on the language used in queries or in texts. Fundamental issues and questions dealing with the notion of a retrieval model and document relevance will need to be integrated with what NLP techniques have to offer if really significant progress in retrieval effectiveness is to be expected." (Smeaton, 1992, p. 277)

Sparck Jones also argues that in NLP theoretical models do not have a clear relationship with the implementation of actual techniques. She questions the importance of models in general and argues that, if they are used, they must have a clear relationship "to critical factors regarding term occurrence" (2000, p.64) in documents. In her view NLP fails in this respect. NLP then, can be seen as theoretically disappointing in this sense but there is also the question of whether on a conceptual level its approach to meaning is appropriate for IR. Salton   and McGill (1983) argue that firstly there is no evidence that NLP methods improve performance and secondly that this might be because this kind of detailed analysis is more appropriate for AI systems than IR systems. As such it is not a problem with the technology *per se* but rather that the model of language assumed by

NLP is not appropriate to IR. AI systems generally try and provide answers to questions in a tightly circumscribed subject area; IR's goal is to provide relevant documents.

> " …a fundamental difference exists between information retrieval on one hand and certain other language processing tasks on the other. In retrieval one needs to render a document retrievable, rather than to convey the exact meaning of the text. Thus two items dealing with the same subject matter but coming to different conclusions are treated identically in retrieval, that is, either they are both retrieved or they are both rejected. In a question-answering system or language translation system, these documents would of course be treated differently." (Salton and McGill, 1983, p.267)

Thus, for example, if a system is required to answer a question about 'apples' then it is necessary that it has some understanding of 'apples'; if it is only required to retrieve documents about 'apples' then the recognition of terms is sufficient. Thus, it may be that NLP is simply inappropriate for general IR because its detailed analysis of meaning, whilst appropriate in some contexts such as translation, is not appropriate for the varied and diverse range of meaning within IR systems. Ingwersen, coming from a very different research tradition than Salton and McGill, also argues against NLP claiming that "the principle of translating request and texts into meaning goes against the entire issue of 'aboutness'" (1992, p.191).

This view does, however, depend on a particular view of meaning and IR. Why exactly is question answering inappropriate and even if it, is it really *always* unhelpful? More recent TRECs (Voorhees, 2003) have included question answering experiments so it is seen as part of IR by some researchers. There seems no reason to regard improvements in the meaning analysis of queries as any less important than improvements in the meaning analysis of documents.

The application of syntactic level document analysis, as opposed to term-based statistical level document analysis, has, however, generally been disappointing. Its theoretical basis is felt by some to be inadequately thorough (Smeaton, 1992; Sparck Jones, 2000) and by some in both the objective IR tradition (Salton and McGill, 1983; Sparck Jones, 1979)

and the subjective (Ingwersen, 1992) to be totally inappropriate. It would appear to be the case that NLP can be useful to IR in terms of query analysis or in other similar limited domains but that its use on large document collections is at least open to question.

In general the addition of more complex techniques than term selection and weighting have not significantly improved the meaning representation of documents in large IR systems. For many in IR this is unproblematic; most participants in large- scale test collections such as TREC (Sparck Jones, 2000) continue to work on gradually improving and refining existing methods. If these systems work reasonably well there is no need to be concerned that they appear to have no sound theoretical basis in meaning. As Sparck Jones (2000) observes in one of her overviews of TREC there is much evidence of "participants' natural instinct to pursue what works rather than why" (p.84).

These automatic indexing techniques are limited in their ability to capture the meaning of documents but relatively straightforward to implement and reasonably effective. There are however, a number of IR researchers (Blair, 1990; Blair and Kimbrough, 2002; Brier, 1996) who are frustrated with the existing techniques. There appear to be two main reasons for this frustration. Firstly there have been no dramatic improvements or breakthroughs and secondly there appears to be no clear relationship between what works and any theoretical understanding of language and meaning. Thus there have been some gradual improvements in performance, at least in terms of TREC data (Sparck Jones, 2000) but no clear indication of any major improvement and a very limited growth of a theoretical understanding of why certain techniques have certain effects. The IR researchers discussed in the next section generally share the view that the reason for this lack of progress is because not enough effort has been put in developing and using a theoretical understanding of meaning. Thus they use theories of meaning within philosophy, normally drawing heavily from the later Wittgenstein (1953), to try and improve our understanding of what meaning is. The ambition is that this new improved understanding of meaning will provide ideas for better techniques and methods of representing meaning.

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5.3 Developing a theoretical framework for IR

The nature of this enterprise all depends on what one means by theory. In IR, theory is used to describe a variety of different approaches. Some of these do not explicitly discuss meaning, such as work in the mathematical (Dominich, 2000) approach or they discuss meaning in a formal way such as in the logical (Huibers, 1996) tradition. Some researchers, however, discuss meaning in a way which is closer to our every day use of meaning and argue that IR should use work in the philosophy of language to improve understanding and practice in IR. The philosophy of language itself contains many different approaches to meaning. The logical tradition in IR has sometimes drawn upon philosophical work on logic, information and meaning (van Rijsbergen, 1986, 1993b). This thesis concentrates on work in IR which uses the philosophy of language but mainly from the social practice perspective within philosophy rather than the logical or mathematical one. This view of theory is broadly understood as the use of philosophy of language to inform the understanding of meaning in IR. This section reviews the major contributors to this field, mainly Blair (1990; Blair and Kimbrough, 2002) but also Brier (1996), and examines the extent to which, so far, this kind of philosophy of meaning has been useful to IR.

Blair's theoretical context to his work is the philosophy of the later Wittgenstein (1953). He uses Wittgenstein's critique of both mentalism, or the view that meaning is internal and subjective, and of behaviourism, or the view that meaning is external and objective. These approaches cannot adequately account for meaning because they fail to explain how meaning is normative, i.e. the ways in which consistency of meaning is enforced. The subjective approach also leaves us with the problem of the mysterious nature of the mental event that is hypothesised to cause meaning and how this can be related to that which it signifies. Blair argues that the objective tradition in IR has focused too much on the superficial aspects of meaning and that the subjective tradition has focussed too much on the inner experience of meaning. In their place Blair suggests that IR should use the pragmatic, or social practice view of meaning as suggested by Wittgenstein.

His first thesis is that IR is a linguistic problem and thus it is primarily about language. Therefore if we want to understand IR we first have to understand language.

> "We must have some idea how language works if we are able to use it effectively in representing documents for retrieval." (Blair, 1990, p.321)

In order to progress in IR, then, we have to improve our knowledge of language and a promising way to do this is to study Wittgenstein's work on meaning. According to Wittgenstein language works through our shared social and physical contexts or, in his terminology, our form of life. Blair argues that the language of IR must also be based on the general structures of the activity or activities that it serves. If there is agreement in the form of life, or in shared contexts and practices, then there tends to be an agreement in language; meanings are shared and problems of ambiguity and interpretation are minimised. Thus, he argues our use of language in IR must be made more like our use of language in ordinary life.

The difficulty in IR is that some of the aspects of our ordinary use of language, most critically a shared social, physical and temporal context, are not present. IR forces us to use language in an abstract way divorced from any particular form of life. Blair argues that, for example, searching large-scale databases does not correspond to a form of life. This statement does raise a question, which is not explicitly acknowledged by Blair; is this abstract quality simply a quality of text as opposed to the nature of speech, which forms the subject of Wittgenstein's work? Blair sees IR as a communication process between the enquirer and the indexer, which, because it operates outside a shared social and physical context, is very likely to be open to ambiguities and varied interpretations. This lack of clarity about shared meaning makes it difficult for the enquirer to effectively search for documents.

> "In the previous chapter we showed that IR could be seen as a process of communication between inquirers and indexers, and that the fundamental issue of IR is how documents are to be represented for successful retrieval. This is a problem of language and meaning, or use." (Blair, 1990, p.249)

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"The model of IR which we have been proposing is based on the proposition that representing and searching for documents is fundamentally a process of language and communication. The major design question then is how to enhance or facilitate this process of communication." (Blair, 1990, p. 266)

This communication process is a rather poverty stricken one because the two participants, the indexer and the enquirer, are separated by time and place. This makes it hard for the enquirer to think of the terms that may have been used to describe the document.

"One of the major obstacles which the enquirer faces is the fact that he may find it difficult to think of all the possible search terms which are likely to have been assigned to documents which he would find useful." (Blair, 1990, p.53)

"It is impossibly difficult for users to predict the exact words, word combinations and phrases that are used by all (or most) relevant documents and only (or primarily) by those documents." (Blair, 1990, p.101)

Blair argues the usual indeterminacy of language is exaggerated in IR because IR takes place outside the context in which the meanings of the documents were generated.

"We can now see that the ambiguity of indeterminacy in language is unavoidable when it functions outside of the activities or institutions in which it has a role." (Blair, 1990, p. 323)

Thus he is using Wittgenstein's arguments about the role of context or use in resolving indeterminacy and arguing that, because these are missing in IR, effective searching is very problematic. Textual information which normally provides the basis for meaning representation often does not adequately relate to the semantic or pragmatic levels of meaning of the document. It cannot accurately predict what the document is about (its semantics) or it possible uses (its pragmatics). He uses Searle's (1969) distinction

between the institutional facts of language (its meaning and use) and the brute facts (the actual text) to illustrate his argument.

> "The institutional facts of language are not derivable from the brute facts of language, no matter how detailed and rigorous these statistics may be." (Blair, 1990, p. 210)

For Blair it is information outside the document, its context or use, which is of primary importance in establishing its meaning. The textual content is not very effective at representing one document's meaning and it is an inadequate tool for identifying the connections between documents.

> "Much of the information necessary for establishing links between documents is external to the text of the document and is usually not easily derivable from the text." (Blair, 1990, p.210)

This statement is interesting in terms of the development of collaborative filtering in IR, which is now commonly used in web search engines such as Google (www.google.com) and for internet commerce such as Amazon (www.amazon.com). This technique, which some researchers have related to Wittgenstein (Chalmers, 1999), allows the sharing of information about what other users, who also retrieved your document, retrieved as well as your document. The assumption is that if, for example two users both retrieved document x there is a reasonable possibility that they might share an interest in the other documents they both retrieved. Thus this technology does manage to provide information outside the text in so far as it allows one to find out something about the context of other users who have also retrieved the text. This evidence is still only textual because all you know about the other users is what they have retrieved. It is therefore an incomplete indication of shared context but it does give some indication of it.

Blair argues that in order to address the weakness in IR, caused by its over reliance on text, some of the pragmatics aspects of meaning should be incorporated back into meaning representation. If, as Wittgenstein argued, meaning is use, then the use of documents should be part of how they are represented.

"The goal of any document indexing strategy should be to build as much of the missing activity or institutional context back into the language of representation." (Blair, 1990, p.323)

The pragmatics, however, of incorporating pragmatics into meaning representation are difficult to implement. Blair argues that IR is currently a communication process that doesn't work very well and that efforts to improve IR should focus on putting back what is missing into this process. IR needs to become a more effective communication process between the enquirer and the indexer. The indexer and enquirer are in two different forms of life (p.155) and the gap between these two forms of life needs to be reduced. If there is more agreement in forms of life then there will be more agreement in meaning and thus a more effective, in terms of being less prone to ambiguity and indeterminacy, communication process. To be more successful, document representation must be used in ways similar to the ways that ordinary language is used, i.e. based on demonstration (feedback and learning) and activities (the use of contextual information to represent documents).

Before proceeding to examine Blair's suggestions on closing the gap between the forms of life of indexers and users it is worth considering whether, in fact, this gap does actually exist. Anderson (2002) argues, also using Wittgenstein's philosophy in terms of his emphasis of the social over the individual, that this perceived divide in IS and IR is inaccurate. He is focussing more on the lack of divide between authors (as producers) of knowledge and users rather than between indexers and users, but the critique can be usefully applied in both cases.

"The users and producers (of knowledge) are *not* two different agents approaching the task of seeking and producing knowledge from different angles. They are part of an activity that uses various written activities in order to accomplish a common goal. The discursive and rhetorical means they have available are both a product and a tool in this activity." (Anderson, 2002, p.477)

Thus, for Anderson, the very idea that there are somehow two, or indeed more, radically different groups and associated perspectives on meaning, knowledge or information is erroneous. In my view this difference between two researchers, who are purportedly using the same philosopher, may reveal a tension and a conflict in Wittgenstein's own work. Wittgenstein is arguing that there is both a unity in our meaning because we do all share the same of form of life or language game but there is also diversity because, within this broad consensus, there are many different types of social group and many different types of ways of using language. It appears likely or at least probable that both these arguments are broadly and simultaneously correct. This does, however, mean that it is not straightforward to draw clear conclusions about how Wittgenstein's philosophy may apply to IR.

Blair's work seems to emphasise the differences or diversity in our use of meaning and he has three main suggestions to improve the communication in IR. Firstly, it should be made easier for enquirers to learn how to use document descriptors effectively. The enquirer should be able to learn both the general language game or context, and the specific usages of a search term he is interested in using. Secondly, subject descriptions should be contextualised, i.e. not only should their content be used to represent meaning but also their context and possible uses. Finally, IR systems should encourage communication between enquirers and indexers. In the case of automatic systems, feedback should be provided to the system about the enquirer's use of terms and it should also be made clear to the enquirer which terms are working best. In practice, it can prove difficult for users to understand and utilise this kind of feedback (Robertson *et al.*, 1997).

In some of his more recent work Blair (Blair and Kimbrough, 2002) argues that certain documents in a collection could be selected as exemplary documents and used both to assist the learning process of enquirers as well as providing context to their subject matter. His suggestion is that, in order to bridge what he perceives to be the gap between the document representation and the enquiry, exemplary documents should be used as a guide for indexing other documents. Exemplary documents are defined as those that describe or exhibit the intellectual structure of their subject area. These exemplary

documents, which could also be seen as seed documents, would have to be representative of their fields and they could then serve as an intellectual road map to the semantic content of a given set of a documents. Specifically it would be used to develop an indexing scheme based on the terms within the documents and their place within their narrative context. Thus abstract principles of representation could be developed which are based on particular documents.

His theoretical justification for this approach is also Wittgensteinian. IR is primarily a linguistic process but the difficulty is that, within IR, one loses the context that reduces ambiguity. Blair uses Wittgenstein's arguments that we learn languages by having the use of expressions demonstrated to us as a theoretical support for his proposal to help users learn the use of indexing terms through good examples. In Blair's (Blair and Kimbrough, 2002,p.370) view it is no "great intellectual leap" to see that the enquirer should be helped to learn indexing languages in the same way that he or she would learn a foreign language. Exemplary documents can help enquirers because if they can see how they have been indexed then they learn how indexing terms are used in general. It could be argued, however, that Blair certainly takes a sizeable intellectual leap in this argument. The passages in which Wittgenstein discusses primarily how we learn languages (Wittgenstein, 1953, 1-39) are a critique of the Augustinian doctrine that children learn by observing adults pointing to objects and naming them. Wittgenstein is alerting us to the fact that language is far more diverse than naming objects and also that pointing in itself is a learned activity based on a particular social context. It is not clear, even if we assume that Wittgenstein is right, that this learning process can be compared to using particular documents to navigate databases. Learning our first language is different from learning a second language and learning an indexing language may not necessarily be like either of these. Wittgenstein (1953) specifically criticises Augustine for assuming that we learn our first language as if we were learning a foreign language.

> "And now, I think, we can say: Augustine describes the learning of human language as if
> the child came into a strange country and did not understand the language of the country;
> that is, as if it already had a language, only not this one." (Wittgenstein,1953, 32)

Wittgenstein is arguing that, before one learns a language, one already has to began to master our form of life. Augustine's thesis about pointing and naming may be more true for a foreign language because, by the time most people learn a second language, they are already conversant with our social context. Learning a second language is actually fundamentally different from learning our first language because one involves the process of mastering language *per se* and one does not. Thus, in using Wittgenstein's arguments here Blair makes a big assumption that learning an IR system is similar to learning a foreign language, and it is the kind of assumption that Wittgenstein appears to be warning us against. An indexing language is both foreign to us in so far as it is different from the familiar way we use language but it is also not foreign to us as it is based on our own language.

Blair work consists of a thorough and far-ranging attempt to use Wittgenstein's philosophy of language to help solve or at least improve some of the problematic areas of IR. He claims that IR is a linguistic process, one in which language and meaning are central, and that, therefore IR can and should learn from theories of language.

I argue, however, that there are a number of weaknesses in his approach. The first issue is whether his use of Wittgenstein's philosophy is always appropriate for IR. IR is about recorded meaning, which is normally textual. Wittgenstein's work is about spoken language. Unlike some other philosophers of language, such as Derrida (1967) Wittgenstein does not discuss in detail the nature of text *vis a vis* speech. Wittgenstein argues that meaning is often, but not always, a question of how a word is used.

> "For a *large* class of cases - though not for all - in which we employ the word "meaning" it can be defined thus: the meaning of word is its use in the language." (Wittgenstein, 1953, 43)

In a speech situation use and context play an important role in meaning. Their role, however, may be less important when dealing with the more abstract nature of text.

Blair's view is that IR should become more like spoken communication by adding context and feedback to the retrieval process. He argues that this would reduce ambiguity but is this necessarily a desirable thing? The possibility of different interpretations can be seen as both a strength and a weakness of recorded meaning. Indeed a user might search in an IR system for a different perspective, perhaps even in opposition to the one used in the context he or she is familiar with, on a particular issue.

Ingwersen (1992, pp.196-200) criticises Blair for an over emphasis on meaning rather than information. In Ingwersen's view Blair is too concerned with finding the one meaning of a text rather than exploring the way in which it may have multiple meanings. He argues that Blair ignores the importance of redundancy and wants to replace existing forms of representation with his pragmatic technique rather than to combine them. Ingwersen, in contrast, focuses on information in terms of whether a document has altered someone's knowledge state. At the same time he shares with Blair the view that IR is a process of interaction or communication.

Blair assumes that the user perception of relevance is paramount. Hjorland (1997), however, argues that sometimes users are not able to recognise relevance and, in particular, they fail to realise how much of relevance may be missing from their results. Thus the involvement of users in refining search terms and weighting indexing terms may not necessarily result in better information retrieval. There may, indeed, be a tension between the user's view of meaning and whether or not he or she has actually been informed.

The discussion in chapter 2 showed that Wittgenstein's work can broadly be understood as an attempt to bridge the subjective/objective divide in meaning. He does this by revealing that observation of our use of meaning in shared social and physical contexts shows us that, at the moment of use, meaning is normally unproblematic. In our activities, and particularly in our rituals, the conflict between the subjective and the objective loses its power.

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IR, however, as Blair acknowledges, takes place outside the contexts in which the meanings of the documents were generated. It is at least questionable whether attempts to add back in this context really make that much sense. The power of text is that is can escape particular contexts and be used in a different context and in a different way than that which was originally intended or imagined. There is also the issue of whether it is valid to separate so completely the ideas of content and context. Commentary on Wittgenstein (Winch, 1969) has argued that these two aspects of meaning must be understood in tandem and that Wittgenstein did not, in fact, totally reject the importance of content or reference in meaning. The importance of this connection does seem to be valid. The contents of a document do give an indication of both its semantics (what it is about) and its pragmatics (its context and how it might be used). They do not give a completely foolproof and reliable indication, Blair is right to say that misinterpretations can occur, but to suggest that they give no indication at all seems unjustified. If text gave no indication of meaning then documentation would be futile. Wittgenstein is not arguing that content is irrelevant just that, if you want to know what meaning is, you have to see it in action. It is in our actions that meaning is fixed but this does not imply that this is all there is to meaning.

On an implementation level there is also the issue of whether efforts to incorporate context and use into meaning representation would be worth, in terms of improved performance, the considerable extra work involved. The discussion on NLP showed that complex analysis of text at level beyond term based indexing does not always achieve significant improvements. There is also a possible alternative conclusion to Blair's emphasis on the role of context and use in IR. Rather than attempt to automate this process it could be used as evidence for the importance of human intermediaries as they can help resolve ambiguities and understand particular contexts. Then IR actually would be more like spoken communication. This conclusion seems far more in the spirit of Wittgenstein who was a champion of communal life and very dismissive about computers.

Blair's contribution to an understanding of meaning in IR is weakened, in my view, by his failure to adequately distinguish between speech and text and, as Ingwersen (1992) also argues, by his failure to adequately distinguish between meaning and information. As I argue in more detail in the next chapter, IR exists in a tension between meaning and information, and any attempt to explain IR must acknowledge the complex and contradictory nature of this relationship. If IR became less difficult, if as Blair argues the indexers and searchers had a shared understanding of meaning, would that necessarily make it more informative?

More recent work that uses Wittgenstein includes Brier (1996) who argues that his work develops a whole new paradigm for IR by showing how use and context are vital to meaning.

"Words do not carry meaning. Rather, meanings are perceived on the basis of the perceiver's background experience." (Brier, 1996, p.322)

In his view the dominant tradition of the information-processing paradigm in IR has resulted in a failure to acknowledge the complex nature of meaning.

"The information processing paradigm has never been able to describe the central problems of mediating the semantic content of documents from producer to user which documentalists and librarians deal with. Basically this is because it does not deal with the social and phenomenological aspects of cognition (i.e. becoming informed) which is after all the bottom line in the mediation of documents." (Brier, 1996, p.308)

The solution, according to Brier, is for IR to focus on small specialist groups where it would be much easier to form a shared language game between indexers and searchers. Thus in one sense his approach is similar to that of the artificial intelligence community, as previously discussed by Smeaton (1992), in that it aims to reduce the problem of ambiguity in language by restricting the scope of the system to a limited domain. Brier argues that discourse analysis should be carried out on these particular groups and that the data gathered from this could be used to design better systems of meaning

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representation. His work seems to contain many untested assumptions. Firstly, is it actually the case that specialist groups suffer less from ambiguity than the general population? Secondly, as Salton and McGill (1983) observe, specialist knowledge management systems are based on the question answering model rather than IR. They are normally used for a specific subject to answer specific questions. IR, which involves the search for relevant documents rather than specific answers, is different from this and thus restricting it to specialist domains may not be so successful.

It is also not clear that Brier really has developed a new paradigm in so far as it may not be new and also that it probably isn't a paradigm anyway. In 1977 Maron discussed in detail the meaning of 'about' and concluded that it has at least three meanings. Firstly, there is the subjective experience of the user; secondly, there is objective observable searching; and finally, there is behaviour of the groups of individuals who constitute the users of a particular IR system. This final sense of 'about' is the probability of how many of them would be satisfied with a document that contained the terms in question and how many of them would use those terms to search for documents about that subject matter. Thus Maron provides a social perspective on 'aboutness' based on user behaviour rather than an abstract perspective based on meaning which pre-dates Brier by many years.

Indeed the problem for IR does not appear to be identifying the different aspects of meaning - Maron's three concepts of 'aboutness' parallel the subjective, objective and social practice views on meaning - but rather to explain how they interact in the particular meaning situation which is IR. Brier, unlike Maron, does relate his view of meaning to a particular philosophy of meaning but this does not necessarily clarify the debate. In a similar way to Blair he does not make an adequate distinction between speech and text or between meaning and information. There is also too much emphasis on the role of use in meaning. Brier's (1996, p.332) claim that "words do not carry meaning" seems to be patently false and does not, in my view, accurately represent Wittgenstein's arguments. Wittgenstein is arguing that words do carry meaning but we can only understand this process if we look at how they are used in particular contexts and how this relates to the general shared context of our form of life. Brier, in contrast, almost appears to be arguing

that words are irrelevant to meaning, a position that appears untenable and is certainly unhelpful to a text-based activity such as IR. This kind of approach cannot operate as a new paradigm for IR because, if it actually was a paradigm, it would have almost instantly been rendered obsolete by an observation of the data about meaning. A paradigm also suggests a complete and structured view of meaning and the folly of such a project is a major theme in Wittgenstein's philosophy.

The use of philosophy in IR, then, to improve its theoretical framework and thus provide anticipated improvements in meaning representation has produced some interesting ideas and comparisons without necessarily progressing understanding to any great extent. In general the assumption has been that ideas in philosophy about the importance of social practice in meaning can be applied to IR in a way which will resolve the perceived impasse between the subjective and objective traditions. The ways, however, in which IR may be different from our ordinary use of language have not been adequately explored. I argue that IR, because it deals with both information and meaning, has a particular relationship to the subjective/objective divide, which means that this conflict cannot wholly be resolved by an appeal to social practice.

5.4 Conclusions

This discussion on meaning in IR reveals what a difficult and problematic research area it is. Two of its central problems, meaning representation and theoretical development, seem very difficult to progress and, even more strangely, seem to bear very little relationship to each other. Work on understanding meaning beyond the term based level, either at the syntactic level in NLP or at the semantic and pragmatic levels as seen in the work of Blair and Brier, does not seem to necessarily result in better systems of meaning representation. Rather than, as in most disciplines, operating in a productive relationship, theory and practice in IR seem to be at odds. There is also a conflict between theories in IR. In a similar way to IS, we see evidence of the conflict between the relative importance of the subjective and objective aspects of meaning and some efforts to resolve this through an appeal to the role of pragmatics or social practice.

I argue that, in order to improve our understanding of IR, we have to examine in more detail how all these conflicting elements of IR relate to each other. My thesis is that, in many cases, the nature of these relationships can be clarified by interpreting them as ones of dialectical conflict. The next chapter introduces the dialectical model as a way of understanding these relationships. This then leads onto a discussion in chapter 7 about how the dialectical model can be used to tackle some particular problem areas in IR.

6 The dialectic of meaning

So far it has been demonstrated that meaning plays a crucial role in both information science and information retrieval, at both the level of their fundamental concepts and also their core activities. This thesis now proceeds to examine the question of whether a new model or perspective of meaning can offer some illumination as to how exactly these meaning issues are played out in IR. The proposed model is the dialectical model, which hypothesises that meaning is a process of dialectical conflict in which the subjective and the objective both repel and rely upon their opposing faction. This model is intended as a way of understanding the different relationships that exist within meaning and, in the next chapter, it is used as a tool for examining how these relationships are manifested in IR.

This chapter introduces a model of meaning as a process of dialectical conflict between the subjective and the objective. This means that the oppositions within meaning are dependent on their opposing element whilst still remaining in conflict with it. So far in IS and IR much discussion (Ingwersen,1992; Ellis, 1996; Hjorland, 1997) has been generated about whether the subjective or the objective should play the dominant role in research. This thesis makes a new contribution to understanding how these different factors interact and provides insights into the exact nature of the relationship between them. It proposes a model, which is understood as a way of seeing or as an interpretative tool, rather than a theoretical framework, which is understood as an explanatory structure. The rationale behind this methodology is Wittgenstein's views on the correct way to improve our understanding of meaning.

> "For we can avoid ineptness or emptiness in our assertions only by presenting the model as what it is, as an object of comparison-as, so to speak, a measuring rod; not as a preconceived idea to which reality *must* correspond. (The dogmatism into which we fall so easily in doing philosophy.)" (Wittgenstein, 1953, 131)

I argue that IR has failed to avoid both ineptness and emptiness in many of its assertions because it is has not clearly understood the distinction between a model, which is an

object of comparison, and a theory, which is a system that can really explain how something works in its essence. It has not understood that these two approaches are actually often in conflict and attempts to resolve this conflict by using a model as an explanatory theory in meaning are normally destructive to developing understanding.

The complex nature of meaning has been explored in previous chapters and the ways in which meaning manifests itself in IS and IR have been discussed. The meaning questions identified so far are: the relative importance of the subjective or the objective; the mechanisms by which interpretation is limited or how meaning manages to be normative; the possibility or nature of a theory.

My first thesis is that all these questions concern the subjective/objective divide in meaning and proposals as to how it could be resolved. Discussion on the subjective experience of meaning or its relationship with objective reality, for example in the work of Frege (1892), normally does this explicitly. Discussion about how meaning rules are enforced, and how theories could be developed, implicitly reveals viewpoints on subjectivity and objectivity. Quine's (1975) arguments, for example, on how shared dispositions to behaviour limit interpretation reveals his emphasis on objectivity, as does his view that apparently subjective mental experiences will in the future be explained by objective biological facts. Thus this divide and the problem of resolving it pervades the philosophy of meaning. Generally this is done by either emphasising the importance of the subjective and arguing that it somehow incorporates the objective, as we see in Searle's (1984) arguments; or in emphasising the importance of the objective and arguing that is somehow incorporates the subjective, as we see in Quine's arguments; or in the thesis that this divide can be resolved by examining the nature of our shared social practice, as we see in the work of Wittgenstein (1953) and also of Putnam (1973).

My second thesis is that these different perspectives can be interpreted as attempts to grapple with the dialectical relationship between objectivity and subjectivity. This chapter proposes a new way of looking at the nature of this relationship. It is argued that this new model, the dialectical model, provides an illuminating perspective on the complex nature

of meaning. It does this by revealing how many of the opposing elements of meaning also rely on each other and thus exist in a state of mutual antagonism and dependence. Thus a model is required which has the tools to explore these kinds of dialectical relationships.

My final thesis is that IR should be understood as a discipline that manifests both this conflict and efforts to resolve it. If IR is understood in this way then many aspects of it, which currently appear puzzling and contradictory, become clearer. There are particular features of IR, primarily the fact that it deals with information as well as meaning, which increase the significance of this conflict and make any kind of resolution even more problematic.

The first section in this chapter provides some historical and philosophical context to the concept of dialectic. The second section explores how the concept of dialectic can be used to explore the nature of meaning and its relationship to information. It is argued that meaning and information are the central concepts of IR and that they contain dialectical conflict and are also often in dialectical conflict with each other. The dialectical nature of these central concepts makes theorising about their nature problematic and the implications of this are discussed. These arguments will be developed in the next chapter where it is shown how these conflicts have particular power in IR. An understanding of their nature can provide new insights into the intractable and persistent nature of many IR problems.

6.1 The nature of the dialectic

The meaning of dialectic has changed and developed over time but essentially it can be understood as a way of arguing about or understanding things that involve contradiction, conflict and change. Thus it concerns both the form of discussion, using conflicting viewpoints to reach the truth, and the content, using its view of conflict to understand things that appear to contain irreconcilable contradiction. In ancient Greek philosophy its use is normally based on the assumption that there is one truth and the dialectic is the art of dispute or argument which will help one to reach it. In its more recent form it tends to assume that truth is fluid and arises from the interaction between opposing forces. Thus

techniques of opposition cannot necessarily lead you to one truth because truth and reality are themselves reliant on both aspects of the opposition. In the former view of dialectic, conflict is used to reach the truth, whilst in the latter view truth is assumed to be conflicting in its nature. Thus in the earlier view of the dialectic resolution is possible, whilst in the more recent perspective the struggle is ongoing. This section will examine these two approaches in more detail in order to provide a context for the ways in which they may relate to meaning.

6.1.1   A method of argument

In ancient Greek philosophy dialectic is the art of debate or a way of investigating the truth of a disputation through logical argument. The formal counterpart to the dialectical method is the eristic or adversarial method, which is a form of argument with the purpose of victory rather than the discovery of the truth. (Sola, 2003; Plato's *The Sophist*, Trans. Warrington, 1961) Thus the dialectical method does involve conflict but the purpose of its oppositions is to gain insight into truth and explicitly not just to win the argument.

The term dialectic can be seen in the Pre-Socratics in the dispute between Heraclitus and Parmenides. Heraclitus (circa 5th century BC) believed that the world was in unity but a unity achieved through everlasting flux and change. In order to understand this debate one needs to know that for the Ancient Greeks 'being' or 'existence' were seen almost as a thing.

> "Parmenides does not treat *to be* as an object, but rather *being*, i.e. something being or some being thing. It is difficult to use the participle in English in the required way, and we might get closer to the sense by saying " what is"." (Anscombe, 1981, p.x)

For Heraclitus everything 'is' and there is no such thing as non-existence. Existence does not and indeed cannot contain any negation. This existence, however, in order to maintain its unity must be able to contain contradictory and conflicting elements. This concept of perpetual flux, characterised by the idea that one can never step into the same river twice, was challenged by Parmenides and Zeno. Parmenides argued that change must be an illusion and that Heraclitus's thesis of the existence of both change and unity contained

contradictions. Change must involve coming into being and this, in Greek philosophy, was seen as a very problematic concept (Anscombe, 1981) because it seems to require the existence of non-being. If something changes then it must manage to retain its identify through firstly, not being, then coming into being and finally being. Since, according to Parmenides existence is in unity, then existence must exclude the possibility of change because change requires separation and distinctions.

Allowing negation or non-existence into one's view of the world would also mean that we might sometimes be thinking about nothing and this is also a contradiction. This would require one object to both be in our minds and not be in the world and this is a contradiction. It is not possible to speak of things that don't exist and things that do exist must exist forever or they would contain their own negation. Logic dictates that we cannot become something that we are not therefore we must stay the same. Parmenides is arguing that once one admits that change exists then one has to admit that non-existence exists and this is a contradiction. If a philosophical argument, in this case for the existence of change, leads one to contradiction then it must be false. This is not only true of the world but it dictates how we should understand the world. Our understanding cannot tolerate contradiction so it is necessary for something to exist for us to be able to think of it: existence is a pre-condition for thought or to put in another way we cannot think about things that don't exist (Anscombe, 1981). In Heraclitus, then, we see arguments about unity but it is unity incorporating change and flux, whilst in Parmenides we see arguments about the unchanging and total nature of unity.

Zeno also believed that reality was an unchanging unity. He develops Parmenides's arguments through developing a series of paradoxes to logically demonstrate that change is an illusion. Motion, for example, is in fact an illusion. In order to reach a destination one must first reach a half way point. When one reaches that half way point there is yet another one to reach and this process is logically infinite. This means that, despite appearances, we can never actually get anywhere.

Zeno's use of logic and rhetoric is known as the dialectical form. A question is posed to which the listener gives an answer: in this case that a man must reach a half way point on any journey. This gives the questioner the opportunity to expound his theory and the listener either has to accept this theory or admit that his logic is flawed. In this case he can either accept that motion is an illusion or he has to admit to being stuck in an endless procession of half way points. Thus, the world must be in unity if one wants to avoid irresolvable contradictions.

Plato also used the dialectic form and his Socratic dialogues are written as accounts of two or more people disputing a problem. In *Parmenides* (Trans. Warrington, 1961) he challenges Zeno to explain his thesis.

> "Socrates listened, and then requested him [Zeno] to repeat the first thesis of the first Book. That done, he asked: 'Zeno, what exactly are you getting at there? Do you mean that if reality is a 'many', many things must be at once like and unlike - which is absolutely impossible, because the unlike can never be like, nor the like unlike?'
> 'I do' replied Zeno." (Plato, *Parmenides*, 127)

In Plato's *The Sophist* (Trans. Warrington, 1961, 238) we hear the stranger discuss with Theaitetos the nature of Parmenides's thesis: they are discussing whether falsehoods can have real existence.

> "The statement implies a daring assumption that what is not has being; for that is precisely what the nature of falsehood implies. But when we were lads, dear boy, the great Parmenides consistently proclaimed the impossibility of this; time and time again he would quote his own poem:
> 'Never shall this be proved, that things which are not, are;
> And do thou, in thy enquiry, deter thy thoughts from this way.'
> Such is his testimony, and the surest way of extracting an admission of the truth will be to subject the statement itself to a mild dose of torture." (Plato, *The Sophist,* 238)

Here we see both a discussion about something that contains conflict, i.e. a dialectical subject matter, and also a resolution to investigate it using the dialectical method. The stranger proposes a stringent analysis of the statement.

> "Then apart from eristic debate and mere playing with words, imagine that one of us were pressed to concentrate his mind and tell the company to what this phrase, 'that which is not' could be applied." (Plato, *The Sophist,* 238)

Plato's philosophy devised a method of synthesising the two opposing world views of constant flux and its alternative of unchanging stability. He argued that there were two worlds. There is the world of senses which contains both being and non-being and does change. It is in this world that knowledge can appear partial and we are able to make mistakes about what we think we know. The other world is the world of the 'forms' or true knowledge, which is both stable and eternal. Forms can be understood as abstract ideal entities existing in a separate world. Objects in the physical world have to somehow participate in or share in these in order to have qualities. Thus Plato is using dialectic as a form of argument to present a synthesis of two apparently opposing viewpoints. In *Parmenides* (Trans.Warrington, 1961, 135) the question of whether reality is a unity or many is discussed and the Platonic doctrine of forms does seem to offer hope of resolution.

> "Par: I must admit, on the other hand, that I was vastly impressed by one thing you said to him [Zeno]; I mean your insistence upon not limiting the discussion to visible particulars or to the visible world, instead of allowing it to range over those objects which are most specially apprehended by discourse and most readily considered as forms.
> Soc. Quite so; unless that is done it is fairly easy to prove that things are both like and unlike, or have any other character you please to name."

Our own knowledge, then, does not come from empirical experience as this must remain imperfect and fragmented, qualities that are at odds with the nature of knowledge. Before we are born our souls live in this perfect world of forms. Thus the appearance of learning and knowledge acquisition is, in fact, the process of re-remembering the knowledge that

we were born with. This is Plato's theory of recollection. In term of Plato's theory then information as we understand it is impossible because it requires the influence of empirical data to change our knowledge. For Plato, however, knowledge is already complete and its nature precludes change. The appearance of incomplete knowledge and change can be explained by understanding that these are only imperfect copies of the eternal and unchanging knowledge in the world of forms. There, is therefore, no contradiction because these processes are happening in two different places. There is an interesting possible connection here to Wittgenstein's view that philosophy is just the re-arranging of things that we already know. In most senses Wittgenstein's philosophy with its emphasis on social context and physicality could not be more different from Plato's but in at least one sense they do seem to share a view about the futility of empirical data in philosophy. Wittgenstein, however, seems to suggest that the correct approach is careful observation but without the aim of building theories whilst, for Plato, the way to knowledge was through contemplation.

In the eighteenth century Immanuel Kant (1798, Trans. Kemp Smith, 1929) used the dialectical method to examine opposing viewpoints in his arguments in the 'Transcendental Dialectic', the second division of his *Critique of Pure Reason*. Kant carries out his critique of reason using the dialectical form. A series of opposing theses (thesis and anti-thesis) of transcendental assertions, for example the case for and against the infinity of space, are presented and it is shown that pure reason can prove both sides to be the case. Thus reason is limited because its claims contain contradictions which it cannot resolve by itself.

> "Their abstract synthesis can never be given in any *a priori* intuition, and they are so constituted that what is erroneous in them can never be detected by means of any experience. Transcendental reason consequently admits of no other test than the endeavour to harmonise its various assertions. But for the successful application of this test the conflict into which they fall with one another must first be left to develop free and untrammelled." (Kant, 1780 Book II, section II, Trans. Kemp-Smith, 1929, p.396)

His philosophy worked to synthesise reason and empirical experience by his concept of synthetic *a priori* judgements. Synthetic judgements are judgements that tell us something about the world, as opposed to analytic judgements that are true by definition rather than because certain things are the case. Synthetic *a priori* judgements are judgements that contain experience and are thus synthetic, but they also contain reasons and are thus *a priori*. He argued that we interpret experience through a conceptual or rational framework (for example the concepts of space and time) and thus these aspects of experience are inseparable and dependent. It makes no sense to speak of pure reason or to speak of pure empirical data. Thus Kant here is using the technique of dialectic to expose contradictions which cannot be resolved by pure reason. He concludes that pure reason alone cannot be the basis for our knowledge as it gives us no method of deciding which side of these contradictions is true. At the same time raw empirical experience is also inadequate. Thus, if knowledge is to be possible, reason and experience must be synthesised in some way.

6.1.2 A perspective on historical change

Since Ancient Greek philosophy, dialectic has been used less to describe a method of arguing but instead as an interpretative model of how societies change. In his *Phenomenology of the Spirit* (1807) Hegel argues that the dialectic provides a way of understanding change because it can show how the past, present and future exist in relationship to each other. He uses an analogy from growth and change in biology to illustrate his argument.

> "The bud disappears in the bursting-forth of the blossom, and one might say that the former is refuted by the latter; similarly, when the fruit appears, the blossom is shown up in its turn as a false manifestation of the plant, and the fruit now emerges as the truth of it instead. These forms are not just distinguished from one another, they also supplant one another as mutually incompatible. Yet at the same time their fluid nature makes them moments of an organic unity in which they not only do not conflict, but in which each is as necessary as the other; and this mutual necessity alone constitutes the life of the whole." (Hegel, 1807, Trans. Miller, 1977, Preface, para 2)

In a similar way to Heraclitus, Hegel argued that existence was in constant flux. He diverted from the traditional view of dialectic in so far as he did not believe there was one single fixed truth to be discovered by any methodology. He also did not believe that philosophical progress depended upon new systems rejecting old systems. Rather he argued that newer models rely upon and build upon existing systems even as they supersede them. This view of change provides some insights into the differences between science and other disciplines as discussed in the information science chapter. Here Hegel is saying that, in philosophy one can never really totally reject, or in Popperian terms falsify, a model, because it will be a component of the new model. This is in contrast to, for example, Kuhn's view of scientific revolutions in which an old perspective is radically replaced. Revolutions, however, also rely on the struggle between opposing forces and what exists after them rarely obliterates previous conflict. Interestingly, Popper (1976, p.132) himself tried to use the dialectic method in his earlier work.

> "Already in 1977, when trying to make sense of the famous "dialectic triad" (thesis: anti-thesis: synthesis) by interpreting it as a form of trial and error-elimination, I suggested that all scientific problems start with a problem (P_1), to which we offer some sort of tentative solution - a tentative theory (TT); this theory is then criticised, in an attempt at error elimination (EE); and as in the case of dialectic, this process renews itself: the theory and its critical revision give rise to new problems (P_2)."

Hegel also used the dialectic as a way of understanding power relationships. In his master and slave argument (1807),which he actually developed from Plato's *Parmenides* (Trans. Warrington, 1961), he reveals the mutual dependence as well as the antagonism between the two roles. The more enslaved the slave becomes the less he can confer status on his master. Being a master of a lowly creature is no achievement. Secondly, the more work the slave does the more productive he is and the more ineffective the master. Thus through the very act of enslavement of the other the master is in fact reducing his status and increasing the status of the slave. The master is also becoming a slave and the more the master tries to demean his slave the truer this becomes.

Thus for Hegel change is absolutely central to our understanding and every situation is unstable. Magee (2000, p.43) argues that this is the most important aspect of Hegel's contribution

"Hegel's fundamental insight, out of which most other aspects of his thought evolved, was that reality is not a state of affairs but a process: *it is something going on.*"

This process of change is not random but the result of an interplay of forces that can be understood as a dialectic.

"He (Hegel) formalised his view of change in what he called the dialectic: any positive state of affairs (let us call our assertion or description of it our thesis) will, merely by coming into existence, call into being contrary and incompatible states of affairs (the statement of this fact will be the anti-thesis) which de-stabilise and cause it to change into something new, a new situation, partly new and partly the same, in which what were destabilising elements in the old become constituent structural features (we call this synthesis). But this new state of affairs, merely by coming into existence, calls into being…etc., etc." (Magee, 2000, p.43)

In Hegel's philosophy, then, change is the primary theme, and the way of understanding how this change happens is through the dialectic. The question remains however, "what is it that is changing?". Hegel saw change as primarily happening to ideas or some kind of spirit; another philosopher, Karl Marx, was to take his ideas on change but apply them to the economic, social and political world.

Marx (1867, Trans. Fowkes, 1976) developed and used some of Hegel's ideas in his theory of dialectical materialism. Marx was a materialist, which means that he though it was empirical reality that determines thought. Hegel, in contrast, was an idealist who argued that it was thought that determines reality. Marx argued that the two forces of thought and reality are continuously affecting each other in a dialectical relationship but that empirical reality is the dominant influence.

Dialectical materialism is the theory that political and historical events are due to the conflict of social forces. Thus change is paramount and it does take place in the dialectical way which Hegel describes, the forces at play, however, are not ideas but economic and material. Social change through history can be seen as a series of class struggles. *The Communist Manifesto* begins with a clear thesis about the nature of this struggle.

> "This history of all hitherto existing society is the history of class struggles.
> Freeman and slave, patrician and plebeian, lord and serf, guildmaster and journeyman, in a word oppressor and oppressed, stood in constant opposition to one another, carried on an uninterrupted, now hidden, now open fight, a fight that each time ended, either in the revolutionary reconstitution of society at large, or in the common ruin of contending classes." (Marx and Engels, Trans. Moore, 1888, p.1)

All societies are therefore built upon essential oppositions between classes. These oppositions are mutually dependent but also antagonistic, as there is one dominant class who is exploiting the other. In capitalism, for example, the owners of the means of production do not give the workers the true value of the work but keep some of it for their own profit. Eventually, Marx argued, these divisions would be superseded by a new system of government, communism, in which there would be no classes. Thus historical change happens because of conflict and the nature of this conflict is dialectical. It contains opposing forces existing in a state of unstable inter-dependence and struggle. In its dominance the oppressor class sows the seed for its own destruction: thus the very means which support its dominance also provide the means which destroy it. The pursuit of profit eventually requires a co-ordinated and educated workforce but these requirements produce a unified and politically aware proletariat which can no longer endure its own oppression.

> " The advance of industry, whose involuntary promoter is the bourgeoisie, replaces the isolation of the labourers, due to competition, by their revolutionary combination, due to association. The development of Modern Industry, therefore, cuts from under its feet the very foundation on which the bourgeoisie produces and appropriates products. What the

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bourgeoisie, therefore, produces, above all, is its own gravediggers. Its fall and the victory of the proletariat are equally inevitable." (Marx and Engels, Trans. Moore, 1888, p.16)

For Marx this conflict could only be resolved in a totally different kind of society and certainly not under the system of capitalism. In contrast to Parmenides, Marx thought change was possible and indeed both essential and inevitable for the creation of a just society.

Thus, in conclusion the concept of dialectic has a number of different interpretations. A recurrent theme, however, is the concept of conflict. The nature of these conflicts is explored in order to gain a better understanding of how opposing arguments or groups relate to each other. Oppositions rely upon each other as well as struggle against each other. Understanding this process can help explain many apparently contradictory aspects of human experience. They appear contradictory because we observe what appear to be two mutually exclusive and opposing forces in existence at the same time. It appears puzzling that one does not just supersede the other. The concept of dialectic, however, allows one to understand that this hasn't happened because, despite the fact that the two forces appear to be in opposition, they are also mutually dependent.

In early philosophy dialectic was used as a method to establish the truth; more recently it has been used as way of understanding the conflicting and multiple aspects of truth. The form and content of dialectic, are, however clearly related. Often the method is used because the subject matter appears to be one full of contradictions. We will now proceed to examine if these methods can perform useful functions for two subject areas that do seem to have many contradictory qualities: meaning and information.

6.2 Dialectic conflict in meaning

The dialectic, then, reveals a way of understanding aspects of human experience which appear to contain conflicting and apparently contradictory elements. My argument is that, as such, it is a useful and appropriate analytic tool for improving our understanding of meaning. It can assist in both improving our understanding of meaning and our

understanding of the debate between different philosophies of meaning. Thus it is useful in examining specific questions about meaning's particular nature and also meta-questions about theories of meaning. Within meaning we have seen the many different ways in which the conflict between the subjective and the objective has been played out and, within and between theories of meaning, we see many different views on the nature of this conflict and if and how it can be resolved. My thesis is that there is no single unified truth about meaning that the dialectical method can uncover. It should rather be used as a way of understanding the conflicting and disparate nature of meaning. I argue that synthesising the multiple, dependent and conflicting possibilities of meaning is not possible in a general abstract sense. This synthesis does happen but it is on a case by case basis. This is one way of understanding Wittgenstein's anti-theoretical stance. One can never grasp meaning in a total theory but if one observes it in action it will make sense. Thus my application of the dialectic to meaning is not an attempt to resolve or synthesise these conflicts but rather an exploration of the nature of the conflict.

In order to synthesise the views of Parmenides and Heraclitus, Plato had to divide the world into two. He created a division between our empirical experience and the unchanging and abstract world of forms. Thus the way to avoid contradiction is to divide things up: thick walls make good neighbours. Unity is an invitation to contradiction but division can be an invitation to alienation. Thus, paradoxically, efforts to synthesise conflict can lead to increased division. Wittgenstein (1922) also had two worlds in the *Tractatus.* He describes them in *Philosophical Investigations* (1953, 107) as the "crystalline world of logic" and our own "rough ground", but, in the end, he could no longer sustain the coherence of this absolute division. He could maintain an abstract theory of language when the world was divided. In his later work, however, he is arguing that these absolute divisions are not what they appear; human beings normally operate closely both with each other and the world. There is also a unity within our own mental and physical life: "the human body is the best picture of the human soul" (1953, p.178). Thus in one sense he is arguing for more unity but this involves a sacrifice in the unity of his theory. His later work on language (Wittgenstein, 1953) shows it both to be a product of our shared life and also something that can only be understood on a case by case basis

in particular contexts. Thus from Plato through to Wittgenstein we can see the conflicting requirements of unity and division in an understanding of meaning.

The philosophy of meaning can then, in one sense, be understood as attempts to divide meaning up into its different elements and then devise explanations for how these different elements can relate to each other. In another sense it can be seen as attempts to re-unite the different elements of meaning and thus claim that such explanations are unnecessary. This can be seen both in the broad subjective/objective divide and also in whether, for example, content or use is seen as more important in determining the meaning of a term. Commentary or critical work on philosophy of meaning can be understood as proposals that the nature of these divisions and their proposed relationships is not what it seems. Commentary on Wittgenstein, for example includes the view (Winch, 1969) that, despite the general assumption in philosophy that he radically changed his mind about the *Tractatus,* there is, in fact, a strong unity between his early and later work. What kind of relationships exist between all these different aspects and understanding of meaning? What kind of forces are both separating them out and bringing them together? The way to understand this, I argue, is to see meaning as a dialectical process.

In our discussion of meaning so far a number of conflicts have been identified. There is the conflict between the two major approaches to meaning: the reference approach which analyses what words must refer to in order to have meaning, and the social practice approach which analyses how our communal practices and ways of living enable words to have meaning. Both of these, in different ways, examine how the apparent disjunction between objective words and the subjective semantic experience manages to resolve itself in a way that produces meaning.

Within the reference approach to meaning there is the divide between those who emphasise the importance of the subjective or mental experience of meaning, in Fregean terms the sense of meaning, and those who emphasise the importance of the objective or external aspects of meaning, in Fregean terms the reference. Within those who favour an

emphasis on the objective aspects of meaning there is the tension between whether one should emphasise the role of external objects (Russell, 1919) or other people and the collective or social aspect of meaning (Putnam, 1973). The latter emphasis moves the theory towards the social practice view of meaning. Other people are a complex element of any meaning theory because they are both subjective from their own perspective and objective from the perspective of those around them. The social practice view of meaning can be understood as an attempt to break down some of these dichotomies by arguing that this subjective/objective divide is not what it seems. Our subjective experience only makes sense within our collective life and our collective life only makes sense on the assumption that other people are like us, i.e. that they also have subjective lives. Wittgenstein is thus proposing one kind of solution to this conflict. He isn't saying that the subjective and the objective do not exist; just that their relationship is of a very different nature than had been previously thought. It can be resolved on a case by case basis; in most of our language use it does not cause a problem, it is our metaphysical approach to language that gives it its apparent power.

All philosophy of meaning, and perhaps all of philosophy, can be understood as an attempt to resolve this subjective/objective opposition. Meaning, however, plays a particular role in this divide because it both relies upon it and works to bridge it. In most cases meaning allows us to communicate our subjective experiences of the objective external world to other people. We normally manage to talk about abstract things and thus bridge the divide between the general and the specific. We also normally manage to communicate with other people and thus bridge the divide between the individual and the collective. If language didn't exist then these activities would be very difficult, but if the divide didn't exist, then language would be superfluous. Thus, the concept of opposing relationships is absolutely crucial to meaning.

My thesis is that meaning can best be understood as process of dialectical conflict between the subjective and objective. This is a conflict in which the opposing elements both repel each other and yet require each other for their identity. Each question in meaning can be seen as a perspective on the relative importance of the different aspects

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of this dialectical conflict and views on how it may be related to its opposite. The next section analyses in more detail the nature of the conflict between the subjective and the objective and the ways in which it is dialectical in nature.

6.2.1 Subjective versus objective

In what ways do these two aspects of meaning both repel and rely on each other? How can it be demonstrated both that there is conflict and that it is dialectical in nature? Firstly they appear to repel each other because they are so fundamentally different in nature. The divide is also not only between the external world and ourselves but also within us in the divide between our mental and physical selves. The first divide that is discussed is the mental/physical divide, which then leads onto to discussion about the divide between the external world and ourselves. Searle (1984) observes that this latter division is really part of the perennial mind/body problem in philosophy. It is not only mysterious how we can have a mental experience about external objective objects, it is also mysterious how we can have mental experiences in our physical objective bodies. The qualities of the physical seem substantively different from the qualities of the mental and, although we experience that they have a working relationship, it is very difficult for us to understand how. Thus we have two entities, the subjective or mental and the objective or physical, which appear to have conflicting properties and yet which also appear to have a close relationship.

What is the role that meaning plays in the division? It comes into the mind/body problem as the difficulty of what actually happens internally when we mean a word. Should this be understood as a mental event and/or as a brain event and how can such an event refer to something outside itself. How can our experiences of meaning actually be about something? Meaning must both be distinctive from what it is about, or it would be an object rather than meaning, and it must also have a relationship with what it is about. Our own experience of meaning, in order to be meaningful, must contain some kind of mental experience or understanding, yet this process seems to require our physical objective bodies.

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There is then a fundamental tension between intension or subjectivity and extension or objectivity in meaning. Philosophers have expended a lot of energy in trying to explain the nature of this relationship between such two apparently different things. Many of them try to avoid the worst of the problem by claiming that one aspect of this tension doesn't really exist; for example Quine's argument against the nature of mental states. He is trying to synthesise the mental/physical conflict by saying that the mental is the physical: they are identical and thus there is really no conflict to resolve. Thus he can be said to reduce the mental to the physical: it is no more and no less. Searle adopts in some ways a similar strategy by arguing that the mental is somehow a feature of the physical: it arises from the physical but it cannot be reduced to it. Thus it is more than the physical as well as being no less than it because it depends on it.

The subjective/objective divide is also played out in the way in which we need to observe the external world but also to make sense of it. Objects exist individually but they also share in general qualities or attributes: there is a relationship but also a divide between the general and the specific. Plato tried to resolve this dilemma by splitting the world into two: one of abstract general forms and one of physical specific objects. The objects then derive their qualities from the extent to which they share in these forms. This relationship is, however, also one fraught with complications. In Plato's *Parmenides* (Trans. Warrington, 1961), Parmenides argues that if the forms have to participate in objects then this could lead to contradictions. The form of 'large', for example, would have to be divided up in order to partake of objects, and thus it would contain 'smallness'. Any form, if required to scatter itself in this way, would become less than itself and thus would be incomplete. This cannot be if the form is required to be a perfect characteristic of itself.

In terms of the meaning, if abstract qualities are to have meaning and be used, then they have to be used to describe objects or events. These specific occurrences, however, will fall short of the full nature of the abstract quality in question. They may be similar to it or partake in it but they will not and cannot be identical. Thus general terms rely on specific instances but they also rely on their differences from specific instances. In a similar way

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specific instances need to refer to general terms but they are also required to be distinct from them. Wittgenstein (1953, 65-67), in his work on family resemblances, tried to resolve this problem by reducing the requirements for what it meant to partake in a general term. He argued, that in order for a number of specific instances to partake in a general term it was not necessary for them to share one quality in common; rather they would share, to varying degrees, a number of related properties. Families do not share identical features but they do resemble each other and, in Wittgenstein's view, we should understand specific instances of general terms in the same way. Thus in the same way that a family can be united as one family but still contain differences, so too can a definition work to group events or objects together without insisting that they all share a common feature. Wittgenstein then is allowing diversity in unity: he is loosening the criteria for what it means to call a number of things by the same term.

This analogy seems slightly less convincing when one considers the genetic basis for family similarity. The parent child relationship for example requires both a sharing of genetic material and a difference in genetic material. In fact, it is relatively straightforward to account for family similarities and differences by reference to how much genetic information is shared in that particular relationship. Thus behind both the differences and similarities is genetic material which could be analysed. Genes can split, fuse and reproduce, in most cases, without jeopardising their nature. The question of how specific instances share in general terms appears to be more problematic. It can be understood as dialectical in nature because the general and the specific require each other in order for meaning to happen and they must also maintain their distinction in order for meaning to operate.

The problematic nature of the subjective/objective divide can also be seen in the problem of how meaning manages to be normative: what are the systems and mechanism for ensuring that meaning is used consistently and that there are limits to possible interpretations? Meaning requires some kind of subjective experience and yet it also requires consistency. Without consistency of application we could not use meaning to communicate with others as we could never be sure that we meant the same thing. We

would also not be able to use meaning to describe the world, as the connection between a word and what it referred to would keep changing. Consistency requires enforcement methods and it is difficult to see, as Wittgenstein and Putnam point out, how these could operate purely on an individual subjective level: a private language is not possible. If our only check on meaning is our own perspective then what criteria can we use to know that we are right?

Thus this difficulty reveals the tension between meaning as an individual subjective experience and the fact that we use meaning to describe the external objective world as well as use it to communicate with other people. There is a divide between our consciousness and the external world, and there is a divide between our consciousness and those of other people. Both Wittgenstein and Putnam argue that the role that meaning plays to bridge this divide is far more powerful than the divide itself. They argue that our shared communal practices and social knowledge structures make it relatively straightforward for us to check our own experience of meaning against external reality and the views of other people.

I would argue that there are, indeed, many structures and conventions in place to limit our possible interpretations of meaning. These systems can, however, break down and meaning appears to both require and reject this possibility. This feature of meaning becomes exaggerated in IR. Indeed Winograd and Flores (1986) use Heidegger's concept of breakdown extensively in their work on information systems. The implications of how IR affects meaning in this way will be discussed more in the next chapter.

The relationships across the divide between our experience of meaning and its role in describing the external world and communicating with others can be understood as dialectical in nature. Meaning is both an attempt to bridge this divide and a manifestation of its existence. Meaning also both requires limits to interpretation and requires that those limits be flexible. If meaning was totally fixed and rigid then it wouldn't be a good enough tool for its various tasks. Conversely if meaning was totally fluid and changeable then it would also be unworkable. Thus meaning can be understood as operating in a

tension between these two requirements. There are structures in place which can work to resolve this tension but this only really works on a case by case basis and not in a general theoretical sense. We now move onto an analysis of the ways in which information can also be understood as a dialectical process and how this relates to the conflicts in meaning.

6.3 Dialectic conflict in information

In the previous section discussing the nature of the dialectical oppositions within meaning it has been shown that the relationship between the subjective and the objective is of a complex and contradictory nature. Different theories of meaning can be understood as different viewpoints on the nature of these relationships and subsequent proposals to resolve them. The advantage of the dialectical model is that it allows one to understand how these opposing features are inter-dependent as well as being in opposition. This means that many of the apparently contradictory aspects of meaning can be incorporated into a model of meaning. It is no longer necessary to minimise or deny particular aspects of meaning in order to maintain the credibility of either the subjective or the objective perspective.

There are then, many ways in which the dialectical conflict between the subjective and the objective manifests itself within meaning. To what extent does information share in this process and to what extent does the conflict manifest itself in different ways in information? I argue that information does share in many of the dialectical conflicts within meaning but that it also contains some of its own qualities and these are often in dialectical conflict with meaning. Thus information and meaning contain within them dialectical conflict and are also often in dialectical conflict. This analysis starts by looking at the different aspects of information and then examines the extent to which the relationship between them can be understood as a dialectical one.

If theories of meaning, as I have argued, can be understood as attempts to divide meaning up into its constituent parts and then explain how these parts relate to each other, then can approaches to information be understood in a similar way? (Buckland, 1991) argues that

information is an ambiguous term that can be understood in three different ways. Firstly there is 'information as process', which is the action of informing. Secondly there is 'information as knowledge' which is what the information is actually about, i.e. facts in the world. Finally there is 'information as thing', which is the data, documents and objects which are regarded as informative. 'Information as knowledge' is subjective and intangible and thus it relies upon 'information as thing' to represent it. For Buckland, then there is a distinction between knowledge in someone's head and the representation of that knowledge as recorded knowledge. This view can be related to the distinction between a word and what it is meant to represent; a relationship that the discussion on philosophy has revealed to be potentially complex.

Buckland aligns these different uses of information within two sets of distinctions. The first one is between entities and processes and the second one is between intangibles and tangibles. This then provides a model that contains four different aspects of information: entities; processes; intangibles; tangibles. The question is, however, how are these different aspects of information and the different uses of information related to each other. The problem of how these apparently conflicting aspects of information may relate has also been raised more recently by Raber and Budd (2003).

> " 'Information' as a theoretical object is in an unenviable position, It must somehow embrace information as a material object, as an individual cognitive effect, and as a social institution. It is applied to signifier and signified, and to the cultural and social conventions that condition the relationship between the two and between the signs they constitute. Information exists in a borderland between texts and contents, between consistency and contingency, between social convention and social conflict, between synchrony and diachrony, between message and meaning." (p. 521)

I argue that the dialectical model can provide a useful tool for examining this question. We may still not envy its theoretical position but we will be better equipped to understand it. The way to understand it is to analyse the dialectical conflict within and between these different aspects of information.

Firstly, there is both a tension and a necessary relationship between information's requirement to be about something (objective) and to inform us usefully (subjective). Information, as Hjorland (1997) argues, is more contingent on situation and time than knowledge and sometimes an approximate but prompt answer is better than a delayed perfect one. Buckland highlights the importance of time in information retrieval. Recorded information is necessarily historic (a record about something the past) which is stored in a way so that hopefully it can inform in the present and in the future. Thus it is communication through time: it is both reliant on the passage of time and also an effort to reach through time. Information that relies on the accumulation of evidence, for example reports of long-term research studies, is particularly reliant on time. It has to accurately describe what happened and also remain accessible. Information is recorded and this means it is something that is unchanging or static (in Buckland's terms an entity) but it has to have the power to change (in Buckland's terms to become a process) or it can't really be information. Information then has to both be fixed in time because it is recorded and reach through time because it will be retrieved. Information is about the past but it can inform us in the present and this may change how we act in the future.

Information's relationship with change is another source of apparent contradictions. In Buckland's model we see that elements of information with apparently contradictory natures are required to relate in such a way that initiates change; for example a tangible entity (a document) is meant to cause an intangible process (a change in knowledge state). The dialectic is well suited to analyse this process, as the concept of contradictory and mutually dependent forces working to initiate change is the core of dialectical theory. The idea that change is an essentially contradictory concept is a useful one for both IR and IS. Information requires change to occur and change is a very problematic and contradictory concept.

Parmenides believed change is impossible because it forces one into logical contradictions. It meant things also had to be things they were not, thus despite outward appearances, change cannot actually be happening. Cole (1997) and van

Rijsbergen (1993a) use Meno's paradox of it could be possible that we recognise or know something that we do not know, to illustrate the difficulty of articulating information needs in IR. In this dialogue, however, Plato (Trans. Syndenham, 1773) regards this contradiction as so insoluble that he concludes that gaining knowledge through empirical experience, and thus by implication the existence of information, is impossible. Plato thought that knowledge could not change, and thus it cannot rely on the changing and temporal nature of the senses, and he argued that we are born knowing everything. Learning is not a question of gaining new knowledge but of remembering what we already do know. Thus the relationship between what we already know and how we add to this is a difficult one to understand. More recently, Wittgenstein in *On Certainty* uses the analogy of the relationship between a river and its bed.

> "It might be imagined that some propositions, of the form of empirical propositions, were hardened and functioned as channels for such empirical propositions as were not hardened but fluid; and that this relationship altered with time, in that fluid propositions hardened, and hard ones became fluid.
>
> The mythology may change back into a state of flux, the river-bed of thoughts may shift. But I distinguish between the movement of the waters on the river-bed and the shift of the bed itself; though there is not a sharp distinction between one and the other." (Wittgenstein, 1969, 96-97)

Thus existing knowledge and new knowledge both shape and are shaped by each other. The water is both contained and given shape and a passage by the river-bed. The river-bed provides resistance to the water but is also shaped by it. One way of understanding the relationship between existing knowledge and new knowledge, the process of becoming informed, is as a dialectical relationship. There is resistance as well as dependence. Heraclitus argued for his doctrine of perpetual flux using the analogy that one cannot step into the same river twice. Wittgenstein here seems to be agreeing in one sense but drawing a distinction between different degrees of changeability and how these qualities may interact.

Information then is about change and normally the change is in a subjective knowledge state but it is caused by an objective entity. In many ways this is an echo of the intension (subjective mental experience) and extension (objective external reality) tension within meaning. Information has to be about something and this aboutness also has to have some subjective effect. Information, however, has a different emphasis on these two aspects than meaning does. We would normally say that a document had meaning even if no one read it. As long as, in principle, it was readable, it wouldn't be meaningless just because it wasn't looked at. Thus in some ways the objectivity or the aboutness of meaning is paramount over subjectivity. Our normal use of information, however, is something that is used and put to work. Thus the subjective is paramount over its objectivity. Wittgenstein distinguished between a private language, which just happened to be spoken by one person but that could have been understood by others, and an intrinsically private language that was indecipherable. He argued that the latter was a nonsensical concept: for meaning to exist it must contain recognisable regularities and patterns that can be learnt. Thus it could be argued that meaning can be circumstantially private, but not intrinsically private, and that information can be neither. Information is reliant on the aboutness of meaning but it also resists it because its emphasis is on the subjective experience of knowledge change. This knowledge change, however, needs to have a close enough relationship to reality in order to be useful but also to simplify or interpret that reality in a way that facilitates knowledge change.

Information then contains within it a number of different and conflicting requirements. It has to be recorded but it is also has to be accessible. It has to be historic but it also has to be relevant to the present. It has to be concrete in the sense that it can be stored but it also has to be capable of initiating change in a mental state. It may be about something very complex but it has to represent and reduce this meaning in such a way that it can be found. This will make it both less about its subject in an objective sense but more about its subject in a subjective sense in so far as it facilitates users to learn about its subject. It has to be passive in the sense that it awaits discovery but it is a passivity with the purpose of being found. I also argue that information, because of its emphasis on subjectivity and change, is often in dialectical conflict with meaning. Information relies upon the meaning

of, for example recorded documents. In order, however, to make this meaning available as information, it often reduces or changes the meanings of documents to make them easier to find. Thus the very process that reduces meaning in the objective sense, representation, also increases meaning in the subjective sense, as more people will read the document. This representation can also, in another sense of objectivity, increase objectivity because it can make it clearer how the meaning of the document relates to other knowledge and sources on the same subject area.

The question for IR is: what is it to do with the contradictions and conflicts that exist both within and between its central concepts? So far, I argue, it has focussed on either trying to argue forcefully that one side of the conflict is correct, for example in the divide between the cognitive and the traditional or archetypal traditions, or tried to resolve the dilemmas through an appeal to social context and practice, for example in the work of Blair (1990; Blair and Kimbrough, 2002) and Hjorland (1997). The former approach tends to rely upon the denial of certain aspects of meaning in order to maintain its relative positions; the latter tends to focus on resolution rather than on exploring the nature of what it aims to resolve. The dialectical model provides a theoretical tool that does not argue for one particular position in the conflict or attempt to resolve it; rather it tries to explore what exactly is so problematic about the way these conflicts emerge in IR. It is in this understanding that theoretical clarity in IR can be improved. In fact, the attempt at a general resolution is a barrier to understanding IR. In dialectical terms any such synthesis must be inherently unstable. The next section looks at the extent to which trying to develop a theory of meaning can be understood as an ambition for such a synthesis and the reasons why this has just tended to add more conflicts and contradictions to an already troubled area.

6.4 Dialectic conflict in theories of meaning

So far in this chapter it has been argued that meaning and information are the central concepts of IR and that both contain dialectical conflicts within them as well as often being in dialectical conflict with each other. Thus the central concepts of IR and their relationships, identified by Kuoakkanen and Vakkari (1997) as part of the cause of its

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theoretical impasse, are characterised by dialectical conflict. This still leaves us with the question of how to theorise about these concepts and their relationships: why has this proved so difficult? In this section I argue that this is partly because theorising about meaning is a dialectical process. It is dialectical in at least two ways: there is dialectical conflict within the process of theorising about meaning and there is also dialectical conflict between the different theories of meaning. Firstly it is a process which is in conflict with the nature of meaning. At the same time, however, we cannot understand meaning unless we acknowledge and understand our strong instinct to theorise about meaning. Thus we won't understand meaning unless we stop trying to theorise about it but we also won't understand meaning unless we understand why we want to theorise about it so much. Theories require generalisations and resolutions or decisions about the way things are. In one sense meaning also requires this but it also resists this as it remains contingent on particular contexts. Secondly the different theories of meaning with their various perspectives on the nature of subjectivity and objectivity, reference and use, etc., are in a dialectical relationship with each other. They rely upon the very aspect of meaning that they claim to reject. The focus in this section is on theories of meaning rather than theories of information. This is because discussion about theories of meaning is covered in great depth in the meaning literature. The insights gained from this concern problems of generalisation and completeness, in terms of the subjective/objective divide with meaning and, in most cases, these also apply to this divide within information. The aim of this section is to argue that theorising about meaning is a problematic and dialectical activity. This discussion is to provide a context for the analysis in the next chapter, which uses the dialectical model to examine in more detail the problems of theory development in IR.

My thesis on the nature of conflicts both between and within theories in IR is that they are a reflection of the nature of the conflicts both within and between meaning and information. These in turn are reflections of the conflict between the subjective and the objective. This can also be seen as part of the conflict between change and stability. In Platonic terms the problem of change and stability is connected to the problem of how we can know: how can our subjective view, which appears partial and contingent have

knowledge about the objective, which must be stable and eternal? The questions and concerns that IR has about its theoretical framework normally come from a perspective which fails to acknowledge the nature of these conflicts and their relationships. This is the cause of the current lack of progress. The dialectical model can help reveal the way in which these conflicts emerge in IR. It can also help explain how theorising about them is an essentially contradictory activity.

I argue that the process of trying to devise a theory of meaning is the process of trying to resolve a dialectical conflict about the nature of meaning and the nature of theory. The work of philosophers who either discuss which is the best theory or discuss the merits of theory *per se* can be interpreted as disputes about how and if one should attempt to resolve this conflict. This dispute is reflected in IR, not only in discussions about which is the best theory and what should count as theory but, also, about whether theory is even necessary or useful to IR. The question under consideration here is the extent to which this problem can be seen as a reflection of the dialectical nature of meaning. The argument is that the theoretical conflicts within IR are a reflection of the theoretical conflicts in meaning and that these, in turn, are a reflection of the dialectical nature of meaning.

Theorising about meaning generally involves attempts to build a theoretical structure and hypothesise hidden causal events within that structure. These attempts are based on the assumptions that we can somehow stand outside meaning to gain a complete understanding of it and that this understanding will have some similarity to the way in which we understand scientific problems. I will use Wittgenstein's philosophy to show that both these ambitions and their associated assumptions work in opposition to gaining an understanding of meaning. At the same time the desire to build structure and to explain meaning is a very strong force in our understanding of meaning. Thus we have to acknowledge and understand the desire to build theories as well as learn to dismantle them. It is only through understanding of both these forces in meaning that understanding can be developed. Wittgenstein (1953, 109) argues that "philosophy is a battle against the bewitchment of our intelligence by means of language" and that we have to learn to

recognise the working of our language "*in despite of* an urge to misunderstand them". Thus if one wants to understand language one has to recognise and overcome the enemies of that understanding. We are not just mistaken about language but mired in superstition about language (1953, 110).

Wittgenstein is arguing that our desire to construct a theory of language is part of the problem of meaning rather than a way to a solution. What exactly, however, is so problematic about this process? This can be understood by analysing the ways in which postulated theories of meaning fail to explain and fail to provide a complete picture or structure of meaning in which these explanations could make sense.

6.4.1 Explanation and completeness

My first hypothesis is that the whole activity of theorising about meaning is essentially a contradictory one. The problem with developing a theory of meaning is that such an edifice would require some kind of systematic structure and some way of explaining the mechanisms of meaning that would operate within that structure. There needs to be an assumption that there is a system and an assumption that something hidden can explain it. In meaning these assumptions are very difficult to maintain.

Firstly it is very hard to find explanations in meaning which do not just add to its mysterious qualities; secondly theories normally require a relatively stable and complete picture of their subject matter. Meaning, however, by its very nature exists in a tension between flux and stability. Also as both Wittgenstein and Putnam observe, we are immersed in meaning and cannot abstract ourselves from it in order to get a God's eye overview.

> "The important thing, it seems to me, is to find a picture that enables us to make sense of the phenomena from within our world and our practice, rather than to seek a God's Eye View." (Putnam, 1991, p.109)

Within IR Ingwersen (1992) criticises Hjorland's (1992) thesis of cognitive authority or "objective classification" by arguing that it assumes the possibility of such a God's eye

view of knowledge representation. We cannot, however we may want to, get outside language, as Wittgenstein (1922, 5.6) argues in his claim "*the limits of my language* mean the limits of my world", so it is not possible to get a clear view of the complete structure or system of meaning. Thus, these philosophers argue that, although it is possible to discuss the nature of meaning in many interesting and illuminating ways, it is not possible to devise a complete explanatory theory of meaning. At the same time, however, there is very strong urge to try and bring meaning into some kind of theoretical framework. As meaning is so central to humanity there is a desire to explain it completely and also an awareness that we cannot distance ourselves from it to the extent that would make such an explanation possible.

The first issue to investigate is the problematic role that explanation has in postulated theories of meaning. What exactly can be meant by explanation in this case and why is it such a difficult issue in meaning? Wittgenstein is very clear that explanation had no place in understanding meaning and, in his wider philosophy, he often warns about the dangers of using concepts as explanations when they cannot adequately perform that role. Thus there are in fact two problems: the difficulty of finding an explanation, and the difficulty caused when a rogue concept is used to posture as an explanation. In *Philosophical Investigations* he discusses his growing realisation that logic is an inadequate way of understanding language.

> "The more narrowly we examine actual language, the sharper becomes the conflict between it and our requirement. (For the crystalline purity of language of logic was, of course, not a *result of investigation:* it was a requirement.)" (Wittgenstein, 1953, 107)

He argues that theorising about language leads one to try and fit language into a limited theoretical model and also to provide explanations by referring to inner or hidden properties. Both of these tendencies lead one away from a true understanding of language.

> "We are talking about the spatial and temporal phenomenon of language, not about some non-spatial, non-temporal phantasm. [Note in margin: Only it is possible to be interested in

a phenomenon in a variety of ways]. But we talk about it as we do about the pieces of chess when we are describing the rules of the game, not describing their physical qualities.

The question "What is a word really?" is analogous to "What is a piece of chess?"." (Wittgenstein, 1953, 108)

In order to understand a piece of chess or a word one should not discuss its inner nature but rather how it is used in a particular game. This is not a theory in the sense that it does not explain something by reference to hidden aspects of its nature and it does not limit it to a particular structure. Words can be used in many different language games

"We can see that what we call "sentence" and "language" has not the formal unity that I imagined, but is a family of structures more of less related to each other."
(Wittgenstein, 1953, 108)

It is the workings of these structures that we should examine in order to understand meaning.

"It was true to say that our considerations could not be scientific ones. It was not of any possible interest to us to find out empirically 'that contrary to our preconceived ideas, it is possible to think such-and–such' - whatever that might mean. (The conception of thought as a gaseous medium.) And we may not advance any kind of theory. There must be nothing hypothetical in our considerations. We must do away with all *explanation*, and description alone must take its place. And this description gets its light, that is to say its purpose, from the philosophical problems. These are, of course, not empirical problems; they are solved rather, by looking at the workings of our language, and that in such a way as to make us recognise those workings*: in despite of* an urge to misunderstand them." (Wittgenstein, 1953, 109)

Wittgenstein is arguing here that meaning is a philosophical problem. In his later philosophy this means that it is a subject which appears problematic only because we persist on seeing it in the wrong way. This incorrect perspective prevents us from asking the right questions with the result that our investigations lead nowhere; a situation, as

Blair (1990) observes, that IR often finds itself in. Wittgenstein quotes from his own earlier work to illustrate his argument.

> "(*Tractatus Logico-Philosophicus*, 4.5): " The general form of propositions is: This is how things are." – That is the kind of proposition one repeats to oneself countless times. One thinks that one is tracing the outline of the thing's nature over and over again, and one is merely tracing round the frame through which we look at it.
>
> *A picture* held us captive. And we could not get outside it for it lay in our language and language seemed to repeat it to us inexorably." (Wittgenstein, 1953, 114-115)

In Wittgenstein's work one sees both detailed philosophical arguments about how developing a unified theory of meaning is inappropriate and damaging to our understanding but also an acknowledgement of its almost irresistible temptations. He argues that "philosophy is a battle against the bewitchment of our intelligence by means of language" (1953,109). He dedicated both considerable effort to developing such a framework and considerable effort to dismantling it.

He argues that philosophy should not try and develop a systematic view of meaning and evoke mysterious inner mental events to explain how the system works. Persisting in such a view of meaning is only a distraction from correctly understanding how language actually works. There is no need to look for hidden data to understand meaning; the data is all around us in how we live. Wittgenstein's distaste for the explanatory power of mental events in meaning can also be seen in the work of Quine (1975), as discussed in chapter 2. Quine was particularly concerned that mental events should not be allowed to posture as possible explanations. His view was that the current state of scientific understanding of the brain prevented us from having an acceptable physiological explanation. Thus he argued that an explanation was possible in principle but that we did not yet have the science of the technology to discover it. Dummet (1979) also expresses a similar concern that theories of meaning can use terms like 'assertion', 'justification' and 'true', which are as problematic as the concept of meaning itself. Putnam (1991) also argues that reference to internal mental representation cannot explain meaning words

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because, in his view, we have no understanding of what such an internal mental representation could be. Searle (1984) suggests a slightly different position in that he proposes that we will in the future be able to understand the physiological causal events behind such subjective experiences. He does not reduce the nature of the mental to the physical, in contrast to Quine's (1975) claims that they are identical, rather he argues that subjectivity is a mental experience but that it could have physiological causes. In the future, Searle claims we will be able to understand how objective things, the brain, cause subjective things, mental experiences.

The other major problem with developing a theory of meaning, apart from the problematic role that explanation could play in it, is the problem of how complete a theory of meaning could ever be. Meaning both transcends the limits of our individual human understanding and is firmly rooted and dependent upon them. Wittgenstein discusses the nature of this problem in his earlier work, the *Tractatus Logico-Philosophicus* (1922). Here he is concerned about the limits of logic, "logic is not a theory but a reflexion of the world" (1922, 6.13), and he introduces the distinction between what can be shown and what can be said.

"Propositions cannot represent the logical form: this mirrors itself in the propositions.

That which mirrors itself in language, language cannot represent.

That which expresses *itself* in language, we cannot express by language.

The propositions *show* the logical form of reality.

They exhibit it." (Wittgenstein, 1922, 4.12-4.121)

"What can be shown cannot be said." (*ibid*. 4.1213)

Here we can see, even in what is widely regarded as a strong thesis for the role of a structured logical theory of meaning, that the limits of such a theory are already being acknowledged. This problem can also be related to Parmenides's early work on the dialectic in terms of how to deal with the reality of things which are not. There are things about our world, such as not-being and change, which appear to resist inclusion in a

logical structure. Parmenides claimed that this means these things, cannot exist whilst Wittgenstein is trying to show a way in which they could (Anscombe, 1981).

Wittgenstein is arguing that any attempt to understand meaning which purports to provide a complete theoretical structure in which hidden causal forces are used as explanations is doomed. This is because the nature of meaning precludes such a structure and such hidden mental events. The nature of meaning precludes this because meaning is a reflection of human life and the nature of human life is both concrete and social. If meaning could be defined in such a structure and if our primary experience of other humans was as objects with carefully hidden and private mental experiences, then language as we know it would not be possible. At the same time we do need some structure. In Wittgensteinian terms this can be found in our form of life but it is also in the syntax and grammar of language itself. There must also be some privacy to our mental experiences or we would not need words to communicate them. This subjective experience, however, is secondary to and dependent upon our shared collective life. It only appears important when we stop using language as part of our normal life and start to try and understand it as an abstract edifice.

Wittgenstein's argument is that the misguided desire to develop a complete theoretical structure for meaning with causal forces is part of a general failure to sharply distinguish between investigating meaning, or indeed any kind of philosophical problem, and doing science. It is failure to identify the important differences between philosophy and science. Harre (2001) argues that the main thesis of Wittgenstein's work is that in investigating philosophical problems the attitude that one takes to the possibility of explanation is central.

> "Looking for explanations, or thinking that one has them when none are in point, is the royal road to ruin." (Harre, 2001, p.226)

Thus attempts to theorise about meaning in the same way that one would theorise about science will not clear up philosophical problems because they are part of the philosophical problem.

> "A philosophical problem is marked by the fact that it is both perennial and intractable. Not because the problem is hard to solve but because it comes from a confusion, muddle or misinterpretation of the discourse forms and conventions current in some point of our lives. Bring out the confusions and the problem simply disappears. It is because of the central role of language in human life that deep linguistic confusions are likely to lead to philosophical problems that look important." (Harre, 2001, p.227)

Harre here is emphasising the importance of Wittgenstein's views on having the correct viewpoints on problems. It is because we persist in seeing meaning in the wrong way that we get confused. If we describe accurately how meaning operates in our lives then we will understand it; if we look for hidden explanations and theoretical structures then we won't understand it because even though we may be looking in the right place we are looking in the wrong way.

In summary my argument is that Wittgenstein's thesis about the nature of the philosophical problems caused by attempts to theorise about meaning reveals that this activity is one riven with conflict at its core. This conflict is dialectical to the extent that our confusions are partly caused by metaphysical theoretical ambitions, which are only made possible by our ability to transcend our normal language use. This transcendence, however, is reliant upon the very thing it transcends. Thus to understand the difficulties of theorising about meaning it is necessary to understand the tension in human life between abstract thought and ordinary life. Theory problems in IR, which do appear to be both persistent and intractable, are mainly a reflection of this wider difficulty about theorising about meaning.

Within philosophy the nature of developing a theory of meaning is seen as an area of investigation in its own right. It involves a tension between the desire to explain and codify meaning and the complex and diverse nature of meaning. The concepts asked to

posture as explanations in meaning are normally no less mysterious than meaning itself and we are also too immersed in meaning to develop any kind of objective theoretical structure. Wittgenstein's proposed solution to this conflict was to abandon such theoretical enterprises and to focus on accurately describing the diversity of ways in which meaning operates. There are no hidden mechanisms in meaning and there is no abstract structure. The structure of meaning is our shared form of life and the hidden mechanisms can be seen clearly in the ways in which we live out this form of life. It is possible to have a way of seeing meaning that clarifies how it works but it not possible to have an explanatory theory of meaning.

6.5 Conclusions

This chapter has introduced the dialectical model: a way of understanding meaning as a dialectical conflict between the subjective and the objective. This model has been used to show how meaning and information, the central concepts of IR, contain within them dialectical conflict and are also often in dialectical conflict. Finally it has been argued that theorising about meaning is a dialectical process. It exists within a conflict between the metaphysical desire to explain meaning within a structure and the complexity and diversity of meaning as it is used. These abstract ambitions are dependent on our everyday use of meaning but, at the same time, they take us away from understanding that everyday use. Thus developing theories about meaning is a process that is, in many ways, in conflict with the nature of meaning. At the same time, we have a very strong urge to try and develop theories of meaning. This is because meaning is both abstract and universal as well as concrete and specific to particular situations. Many philosophical problems are caused by the tension between the diversity of meaning and the systematic nature of the theories suggested to explain it.

Meaning then is a very problematic concept and one characterised by dialectical conflict. When it is combined with information, as it is in IR, it becomes even more complex. The next chapter looks in more detail at the ways in which this model of meaning can be used to clarify some of the conflicts and apparent contradictions that exist in IR. It will examine the nature of theoretical conflict in IR, the problem of meaning representation

and the problem of testing and evaluation. In what ways can we increase our understanding of these problems in IR when we see them from the perspective of the dialectical model?

7 The dialectical model and IR

The main argument in this chapter is that many problems in IR can be translated into the question "why can't we resolve this conflict?" and that in many cases, the answer to that question is "because it is a dialectical conflict". Chapter 6 analysed the conflicts both within meaning and information, and between them. The argument has been so far in this thesis that the central concepts of IR are meaning and information, and that these contain dialectical conflict and also exist in a dialectical relationship. An understanding of the nature of the dialectical nature of these relationships can further clarify many apparently contradictory aspects of IR. The hypothesis is that the paradoxical nature of IR is often a result of the influence of the dialectical relationship between the subjective and the objective. Thus these conflicts are not in straightforward oppositions; rather they are the complex result of the interaction of opposing but mutually dependent forces. This chapter explores the thesis that an examination of the ways in which this is the case can clarify the nature of a number of persistent and apparently intractable conflicts within IR. It is argued that most problems in IR can be interpreted as conflicts and that, in many cases, these conflicts are dialectical in nature.

This chapter tackles a number of problem areas in IR, in terms of theory, meaning representation and evaluation, and assesses how this new understanding of the dialectical relationships within IR can improve clarity in these areas. The general method is to examine the extent to which these problem areas can be understood as ones of conflict and then to analyse whether seeing this conflict as a dialectical one provides new illumination as to their nature. In particular, can one make more sense of any apparently contradictory elements in these problems when both sides of the contradiction are seen as being in a dialectical relationship? The question of whether the relationship between the different problem areas is dialectical in nature is also explored.

The first hypothesis is that IR contains many difficult and intractable problems. The second hypothesis is that these problems can be understood as conflicts. The third hypothesis is that these conflicts seem very hard to resolve. The final hypothesis is that this is because they are dialectical in nature, i.e. they both rely upon and reject their opposing element. All these hypotheses will be argued for in this chapter. The background assumption to all these hypotheses is that IR is a philosophical rather than a scientific problem and that as such what is needed is a new viewpoint or model on its nature rather than a new explanatory theory. The aim is not to solve these problems in IR but to show them in a new light.

The central problems are argued to be the following: firstly, how do you develop a theory about IR; secondly, how do you use this to represent meaning; finally, how do you measure and/or evaluate how well you have represented meaning? These problems have a long history of research both within the cognitive tradition (Ingwersen, 1992) and the objective tradition (van Rijsbergen, 1979). So far in this thesis, primarily in chapter 4, the main problems identified, following Blair (1990), were the problem of meaning representation and the problem of theoretical development. The problem of evaluation or testing was argued to be a manifestation of these two central problems, i.e. the reason why evaluation seems so difficult is that it requires an understanding of how to judge meaning representation in terms of relevance and an understanding of what is being tested in terms of theory. One has to know what one is testing and why. This chapter does review the evaluation issue because debate and practice in this area are very revealing of the many contradictions and conflicts in IR. Evaluation is important because it is there that the relationships between meaning representation and theory are often made explicit. The process of testing forces an attempt at synthesis between theory and meaning representation and, if they are in a dialectical relationship, then efforts at synthesis will reveal this to be the case. It also often relies upon the technology and practical functions of IR and thus reveals the relationship between abstract issues of meaning and information and the possibility of their implementation.

These three problem areas in IR will be analysed as conflicts and then the extent to which they can be understood as dialectical conflicts will be examined. Finally it will be assessed whether this dialectical perspective can help us make more sense of the often paradoxical and contradictory nature of many of IR problems. Thus the purpose is to test the utility of the model as a conceptual tool for IR.

Evidence that these problems seem to be intractable and difficult to solve is apparent in so far as that they are still researched in IR and there has been no definitive answer to any of them. These problems in IR can be related to the meaning questions identified in chapter 2 that have also proved intractable. The problem of how one represents meaning depends on what one thinks meaning is. Different IR approaches focus on the subjective, normally interpreted as the user perspective, or objective aspects of meaning, normally interpreted as textual analysis, and some explore the role of context in meaning representation. Thus the approaches can loosely be categorised by different emphases on subjectivity (intension) and objectivity (extension). In terms of developing theories in IR there is a wide degree of disparity about whether this is appropriate, and if it is, then what should count as a theory. This can, to some extent, be seen as a reflection on the different emphases on theory, in terms of its pertinence and nature, from within the philosophy of language. The problem of evaluation links both these issues in so far as it generally assumes that there is a meaning representation technique based on some theory that can be tested. Thus the nature of the problems in IR seems to be related to the problems in meaning. Therefore, if meaning can be understood as a dialectical process then this should be helpful to IR.

It is not only the conflict in IR that reveals its dialectical nature but also the recurrent desire for synthesis which can be seen in many of the currently proposed solutions. Blair's (1990; Blair and Kimbrough, 2002) appeal to social practice in order to reduce ambiguity, can be interpreted as an attempt to resolve the two aspects of the dialectic of meaning. Ingwersen's work (1992, 1996) also aims to resolve the conflict between the 'system view' and the 'user view' of documents whilst Hjorland (1998a, 2002) argues for an end to the theoretical impasse between the subjective and the objective. Raber and

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Budd (2003) in their analysis of information using Saussure, argue that his distinction between the individual aspects of meaning (*parole*) and the social (*langue*) could possibly be united in IS. Raber and Budd argue that text can be seen as *parole* and its content as *langue* and suggest that "information is a kind of sign that unites text and content" (2003, p.511). This desire for resolution, however, can require an associated denial of the nature of the conflict involved, and thus often leads IR away from a clear understanding of itself. A dialectical understanding can help show both why the conflicts exist (because there is opposition) and why we want to resolve or synthesise them (because there is mutual dependence) and why this doesn't really work (because within a dialectic any synthesis is inherently unstable). In my view the problem for IR is not so much the conflict itself but the conceptual paradoxes caused by attempts to force it to a resolution. Thus an acknowledgement and understanding of the dialectic conflict within IR problems does not solve them but it may make them appear much less puzzling. The model can help show how they have arisen and it can reveal how many of the apparently intractable problems or questions in IR are exacerbated by this desire to resolve the conflict between the subjective and the objective. A dialectical understanding of meaning reveals that many of the unanswered questions in IR, such as whether evaluation should be subjective or objective, only arise because the relationship between these two aspects of IR is inadequately understood.

The nature of the problems of theory, meaning representation and evaluation or testing will now be examined in terms of the dialectical model. To what extent can we gain insights into these areas of IR if we see them as dialectical in nature?

7.1 Theory

Chapter 6 described the dialectical model and argued that theorising about meaning was an essentially contradictory and dialectical process. It was also argued that because IR dealt with information, as well as meaning, that this increased the level of conflict. In theorising about meaning one is often asking "how is it that, despite all our differences, we still manage to normally mean the same thing in language?". In theorising about information one is often asking "how is it that, despite the fact that all these documents

may appear to mean the same thing, it is still the case that only some of them are informative?". Thus in meaning one is often looking for similarities in despite of perceived differences and in information one is often looking for differences despite perceived similarities. Thus, IR's central concepts, meaning and information, are dialectical in nature and theorising about them, in the sense of producing general and testable statements about their nature, is often in conflict with gaining insights into their nature. If theory building is the identification and correct arrangement of central concepts, as Vakkari and Kuokkanen (1997) and Buckland (1991) have argued, then according to the dialectical model, one of the reasons it is so difficult is because the concepts in question, meaning and information, are of a fundamentally contradictory nature and in a fundamentally contradictory relationship with each other. The current situation with IR theory is that it often ends up trying to explain how these two concepts can be different but also the same. Thus, it is stuck in a dialectical contradiction. It does this with meaning because it needs to distinguish between the different aspects of meaning, the subjective and the objective, but it also needs to maintain the connection between them. It does this with the information because it needs to distinguish between its subjective and objective aspects whilst asserting that there is a relationship between them. It also does it with the relationship between meaning and information; both the distinction and the relationship need to be maintained. Thus I argue that understanding these concepts and the relationship between them is a constant process of making distinctions and separations whilst also showing how relationships work between these distinct elements. IR both requires the distinction between the subjective and the objective: without our subjective experience retrieving information would be futile and without objective information it would be impossible to record information, and, at the same time, IR works to reduce or resolve the distinction. It works to reduce the conceptual gap between the information in the system and the information the user requires. My thesis is that this is why IR is so hard to do and this is also why it's so hard to theorise about it. Both implementing and theorising about IR are normally attempts to resolve or fix this conflict. However, once it is resolved it loses its fluidity and some aspects of its nature. Once a user decides they have enough information there is the loss of the potential information they may have gone on to retrieve; once a researcher has

decided on a theory of IR there is a loss of the other potential ways of looking at the problem.

If these arguments are correct then any theorising about IR takes place in a dialectical context; it is in principle an activity full of contradictions and irresolvable paradoxes. The central concepts of IR are meaning and information. Devising theories about these concepts and how they are related has proved to be very difficult. I argue that one of the reasons that it is difficult is because the dialectical relationships, both within and between these concepts have not been understood. This section looks in more detail at theory in IR and analyses whether it can be clarified by interpreting the different theoretical viewpoints as different perspectives on the dialectic of meaning and/or efforts to resolve it. The assumption is that there is a theory problem in IR and that it is conceptual or philosophical in nature rather than scientific or empirical.

The first question that will be analysed is whether it is correct to argue that the current state of IR theory is characterised by conflict. This then provides material to assess whether the conflict is dialectical in nature. The approach taken is to analyse IR theory at a general level, broadly following Frohmann's (1992) arguments that IR theoretical discourse should be analysed as a subject in its own right. In his own analysis his first observation is that although IR often complains of its theoretical sterility, there is actually an abundance of different theoretical perspectives and ideas within IR. This does appear to be the case and this paradox is an interesting starting point for a discussion on the possible dialectical nature of the relationships between these different perspectives and ideas. Why is it that despite the large number of different theoretical approaches, as discussed in chapter 4, there is still a view in IR that it is theoretically weak? I argue that this is because of the contradictory and dialectical way in which these different theories are related. This makes it impossible for one to succeed and replace all the others, because they all rely on each other, and it also makes it impossible for them to co-exist easily because they are in opposition to each other. This is part of another dialectical aspect of theory in IR, which is the uneasy relationship between unity and diversity. There is both a desire for one 'correct' theoretical perspective and recognition that there

are many alternative perspectives. In Ellis's (1996) textbook he writes that one of his motivations for the production of a general guide to IR was the observation from one student that IR was as confusing as an '*avant garde*' opera. This is an interesting analogy as opera, '*avant garde*' or otherwise, is one of the most all encompassing of art forms and also explores the deepest of human conflicts. Thus part of the point of opera is that it does not all add up to a satisfactory whole or a comfortable synthesis.

Frohmann (1992) argues that the cognitive viewpoint claims to be the complete solution to IR and that it presents itself as a total theory (p.371). It is, however, in fact only a partial view of IR as it is very individualistic, relies on experts and insists on a knowledge structure which, Frohmann argues, is an ideological claim. The latter two features are in my view less true of Ingwersen (1992) and perhaps more true of Hjorland (1997, 2000a). Hjorland's claim that science provides objective knowledge, which can then be used for document representation is open to dispute. It is ideological to the extent that it presents a particular knowledge system, in this case science, as part of the natural order of things rather than one perspective among many. He also does not acknowledge that this perspective may serve certain interests better than others. Thus it is a denial of conflict and diversity and an attempt to use one form of knowledge as a way of synthesising all others.

In Frohmann's critique of IR theory, then, we see evidence of both diversity and efforts to reduce this to one true understanding. There is a conflict between the different perspectives and the cognitive tradition can be seen as an attempt to resolve this conflict through the supremacy of its arguments. I argue this critique is broadly correct and that it can be developed by understanding the theoretical situation in IR as a manifestation of the dialectical relationship between the subjective and the objective. Firstly I argue that there are many conflicts in IR about what its theoretical approach should be, which can generally be characterised as a divide between the subjective and objective approaches. Secondly, I argue that it has proved very hard to resolve these conflicts. My thesis is that there are two main reasons for this. The first is that the proposed theories are not scientific hypotheses and thus are not the kind of thing that that can be refuted by data

collection. The second reason is that IR deals with the dialectic between the subjective and the objective. Thus it requires both these aspects of meaning and information whilst at the same time often appearing to reject one of them. It is not possible to decide, once and for all, which is of primary importance or which is the correct way to approach IR. Theories in IR normally rely on the very aspects of meaning and information that they claim to reject. Here we explore the argument that the theoretical debate in IR contains conflict, which then leads onto a discussion about its nature and the value of efforts to resolve it. In what ways can the dialectical model contribute to a clearer understanding of these issues?

Conflict in IR theory can be understood on at least two levels. Firstly there is the broad divide between those in IR who favour the objective approach (van Rijsbergen, 1979; Sparck Jones, 2004) and those that favour the subjective approach (Ingwersen, 1992; Griesdorf and O'Conner, 2002). The objective and subjective approaches normally take the view that they are the one correct approach although van Rijsbergen's most recent work (van Rijsbergen *et al.*, 2004) relies on the IR system observing human search behaviour and thus does acknowledge the importance of the user. In much of IR however, the different traditions may work to disprove the alternative perspective but in many cases they simply do not acknowledge the existence of an alternative perspective as observed by Saracevic (1999). There are also those, such as Blair (1990; Blair and Kimbrough, 2002), Brier (1996) and Hjorland (1997, 2002) who argue for the use of social practice as a proposal to overcome this divide. Thus these approaches desire to synthesise the objective and subjective aspects of IR in some way. The social practice perspective claims that there is no need to decide if the subjective or the objective approach is correct because the use of social practice is able to synthesise both these aspects of IR to provide the complete picture. The objective approach generally ignores the importance of the subjective and thus provides the appearance of a unified and more scientific research programme. The cognitive approach does often set itself up as some kind of synthesis by claiming that the objective or system perspective can be somehow brought into line with the user perspective. All these approaches operate on a fairly general level: they offer a perspective on the nature of IR and its central problems.

The second level of conflict in IR theory can be seen at the level of implementation, in terms of disputes about which is the best technique to represent the meaning of documents. This is not necessarily strongly related to the different perspectives previously described partly because the subjective and the social practice perspectives on IR do not always argue for specific types of meaning representation. One of the main arenas in which these different techniques are compared is the annual TREC experiments. The aim of these experiments is to provide a consistent way of testing a large variety of different IR techniques using the same collection (Sparck Jones, 2000). TREC, however, even within its own terms has not so far provided any conclusive recommendations on which techniques work best. This is partly because many different types of techniques tend to produce similar levels of performance. In her review of TREC, (Sparck Jones, 2000, p.62) highlights as one of the major findings that "many (very) different approaches give similar performances". There is also a problem in terms of the extent to which TREC results can be applied to IR in general. TREC relies on a particular collection and a particular set of relevance judgements. Thus its findings may not be pertinent in different contexts.

One thing, which both the general theoretical perspectives in IR and its specific techniques do share, is a persistent failure to find a conclusive way to decide which one is superior to the others. It appears they cannot be resolved theoretically, in terms of conceptual analysis, or empirically, by appealing to data. The nature of this failure to resolve these conflicts will be examined and then the extent to which it could be due to their dialectical relationship will be discussed. I also argue that it is the desire to resolve these conflicts, either by showing one perspective as superior to the other or through synthesising two opposing perspectives, that is part of the difficulty in IR. The dialectical model provides a tool for exploring the nature of these conflicts without requiring that they are able to reach a resolution or synthesis.

7.1.1 Subjective versus objective theories

This discussion begins with an analysis of the nature of the debate in IR about the conflicts between the subjective and objective in its theories. What arguments, so far,

have been provided about the significance of this divide and what approaches have been taken towards it? My argument is that, in general, theoretical discussion in IR is often concerned with this divide but that there has been limited progress in understanding how the two aspects of the divide are related. The dialectical model can provide a new contribution to this debate by revealing the mutual dependence and conflict between theoretical perspectives in IR.

Ellis (1992a, p.48) divides IR up into the physical and cognitive paradigms drawing on the work of Kuhn (1970). He argues that a paradigm, in the same way as an analogy, breaks down when it is pushed too far. In Kuhn's theory of scientific revolutions this breaking down process eventually leads to the collapse of what was thought of as 'normal science' at that time. Ellis argues that the physical paradigm, as originated in the work of Cleverdon (1966) in the Cranfield experiments, assumes that IR is like a physical system. The cognitive paradigm, in contrast, as seen in the work of Ingwersen (1992) assumes that an IR system has some kind of cognitive state or identity and that the aim of IR is to enable this system to work with the cognitive state of the user.

In Ellis's view the problem with the physical paradigm is that it has no explanatory power because the application of scientific method fails at two critical points, which are measurement and referential scope. Thus, this paradigm in IR has no appropriate measurement techniques and, therefore it is not clear how widely applicable its results are. This leaves fatal flaws in its data collection and an associated failure to develop generalisable theories. The cognitive paradigm fails because its model of the mind is a confusing analogy. The model does add to understanding in the same way that, for example, a model of a bridge could help show its structure. These arguments can be linked to the arguments within the philosophy of language on the impossibility of an appeal to mental events functioning as an explanation of meaning. Mental events are unsatisfactory as an explanation because we do not know enough about what they are. They actually require explanation rather than being able to offer one. In the cognitive tradition the failure of an appeal to the mental may partly explain why the use of this model has not translated into significant, if any, performance benefits.

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In Ellis's view IR is a discipline characterised by duality. This duality is between the people involved in IR, i.e. authors, indexers, intermediaries, and users, and the artefacts involved in IR, i.e. documents, document representation, abstracts, indexes and databases. The physical paradigm focuses on the artefacts and the cognitive one on the people. The tension in the physical paradigm arises because artefacts are inert and can be manipulated like objects but their success must be judged with reference back to the users' relevance judgements. Users, however, are not, unlike artefacts, inert objects or passive recipients of information but they also contribute to its creation, which makes it difficult to translate fixed relevance judgements into criteria for the success of actual retrieval. The cognitive perspective has the opposite problem in that it is hard to translate cognitive processes into the machine. Thus Ellis is arguing that one has to choose between the physical system with its questionable application to the cognitive, or actual experience of information, or the cognitive approach, with its questionable application to the implementation of physical systems.

Ellis argues that the inherent difficulty in IR stems from the inherent categorical duality of its research focus and that if you focus on one you lose the other. In his view IR research is fragmentary because it can only address aspects of the problem that fit within its paradigm but then collapses because the nature of the subject matter cannot actually be confined within that paradigm. Thus it is not possible to really understand IR if one claims that information and meaning are purely physical and objective and it is also not possible to understand IR if one claims that they are purely subjective and cognitive.

Thus, the nature of IR's subject matter requires both the physical (the objective) and the cognitive (the subjective). The two main research traditions in IR, however, tend to assume that only one of these is significant. This means that their work is always limited and unlikely to make significant progress because it denies an important aspect of the subject matter under investigation. The question remains, however, of why this is the case? What is it about the subject matter that produces such a divided research tradition? Why does it seem so hard for constructive work to arise from a combination of the two or

why is IR research fragmented and disparate? Why is there not more work that seeks to incorporate both the subjective and objective aspects of meaning and information? Why is it also the case that work which does attempt this, most notably by using the work of Wittgenstein (Blair, 1990; Blair and Kimbrough, 2002) has not, so far, delivered any significant improvements in performance?

I argue that the dialectical model can further our progress in understanding these questions. This is because it can show how, not only are the subjective and objective in conflict, but also that they require each other. These subjective and objective aspects of IR are in a dialectical relationship. This helps to explain how they appear to be so different but that they also rely on each other. The cognitive approach, for example, relies on the objective computer for implementation. The physical or objective approach relies on the subjective nature of relevance judgements in order to test its techniques. Thus both approaches depend upon the very aspects of IR which they claim to reject. The model can help show why they reject them, because they are in opposition to the other approach, but also why this ultimately fails, because the opposing element of meaning may appear to be in conflict with a particular theoretical approach but it will also be an essential component. Thus in terms of Kuhn's paradigms the reason why the subjective and the objective approaches both ultimately fail is because they are simultaneously trying to both reject and include particular aspects of meaning within their paradigm. The model provides a new way of understanding the nature of their relationship and revealing how the complex nature of meaning and information play out in IR.

The dialectical model can also help assess the appropriateness or otherwise of Kuhn's paradigms as an analytical tool for IR. Their pertinence is suspect because, in Kuhn's sense, a paradigm is the kind of thing that can be overthrown in a scientific revolution. A paradigm is characterised by its tendency to break down when it is forced to incorporate too many contradictions. Paradigms are the kind of thing that it must eventually be possible to discard if they are in conflict with the data. Paradigms in IR, however, are not overthrown, they just seem to exist side by side. Indeed paradoxically one could argue that there is not enough conflict between what are called paradigms in IR; they

consistently fail to beat their competitors in a final and convincing way. The Hegelian view of progress, which he contrasted to the scientific view, can shed some light on this. For Hegel (1807) each new theory or approach relies upon the previous one and could exist alongside it. Thus progress is not eristic, one side does not win over the other, but dialectic, the new approach remains dependent on the one it appears to overthrow. This applies to IR in so far as all the theories in IR can be understood as part of the nature of meaning. Thus it is not possible for any of them to be conclusively rejected because they are all part of meaning. It is also not possible for one of them to supersede all the others because it will rely on the very perspectives that it may wish to supersede. They have an adversarial and a symbiotic relationship. Thus, in one sense, they are all true, but also not true or at least not a complete picture of the truth. This is different to scientific theories in which the views of objects and how they relate are often completely overthrown in scientific revolutions. Indeed in later work, Ellis (1994) decided that the cognitive and physical approaches *can't* even be characterised by the presence of metaphysical or sociological paradigms. I argue that the reason the analytical tool of Kuhn's paradigms are of limited to help IR is because paradigms cannot contain conflict and an understanding of IR requires a dialectical approach that can contain conflict without forcing it to a resolution.

7.1.2 The desire for resolution

So far we have seen that there is a concern in IR about its divided research tradition. Some proposals on how to resolve this divide, or minimise its perceived damaging effects, will now be examined. These approaches suggest a number of different proposals for resolution. The first proposal discussed is the use of science, the second is the dominance of the cognitive perspective, and finally the appeal to the work of the later Wittgenstein (1953) is analysed. My argument is that these proposed resolutions fail because they do not acknowledge that IR requires both the subjective and the objective and they do not acknowledge that despite this mutual reliance the two aspects of IR are in conflict. Thus attempts to resolve the divide in IR either through the victory of a particular perspective or through a synthesis of both cannot succeed because of the dialectical nature of information and meaning.

Ford (2000), for example, explores the divided nature of IR research and appears to propose a resolution through a more scientific research methodology. In his view the fragmented nature of IR research is because it entails the study of people interacting with systems. Thus there are two very different aspects of research in IR, people and systems, and a failure to adequately address the implications of this is part of its research difficulties. He argues that (p.626) IR's "fragmentation and isolation run counter to the process of generating a coherent and generalisable knowledge map". It may be, however that these two qualities of his proposed IR knowledge map could be in opposition. In Wittgensteinian terms the only way to ensure that you did say coherent things about meaning, or things that were accurate about meaning, was to avoid the urge to generalise. At the same time we cannot understand meaning unless we acknowledge the general shared nature of our physical and social context, our form of life. This is both general and concrete rather than general in an abstract way.

In Ford's view (1999, p.1151) the quantitative approach produces highly reliable answers to highly meaningless questions and the qualitative approach produces highly meaningful questions with highly unreliable answers. This seems to echo Ellis's arguments (1992b) that the physical tradition has data but no paradigm and that the cognitive tradition has a paradigm but no data. Ford argues that this situation could be improved if these two research traditions worked more closely together and that the solution to what he calls IR's "pathological research state" (2000, p.636) is a greater methodological pluralism. This would result in a productive relationship between quantitative and qualitative work because the application of multiple approaches allows us to shed light on the phenomena from several different vantage points. Thus he is arguing for a variety of different approaches which should work together rather than just alongside each other. In particular he argues for the need to integrate detailed specific users studies with general system studies. He also argues (p.636), in a similar way to Hjorland (2000a),that IR needs to replace the assumptions in its current models and theories with scientifically based hypotheses that can be tested against data and then used as evidence.

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Thus in Ford's work we see a discussion of the divide between the subjective and objective in IR. The assumption is that this is a result of the way in which it deals with both people and systems. The proposed solution is to have more methodological pluralism but, at the same time, to ensure that these are more closely co-ordinated. This should include the use of a scientific approach in terms of testable theories rather than models based on assumptions. His proposed resolution of the divide is along the lines of 'could try harder'. This still begs the questions, however, of why this divide is so persistent and why the already very varied methodologies used in IR have not, so far, led to a satisfactory level of knowledge and understanding. I argue that the dialectical model can provide some insights into these questions. The subjective/objective divide remains so persistent in IR because these two traditions operate in a dialectical relationship. The reason why IR is fragmented is not, as both Ellis and Ford seem to suggest, just because it deals with both people and artefacts or systems. Rather it is because of the dialectical relationship between the subjective and the objective, which is then manifested in the relationship between people and systems. Thus IR is difficult, not just because it has to deal with two different kinds of things, people and systems, but because the relationship between them is both antagonistic and mutually dependent; it is part of the dialectical relationship between the subjective and the objective. It is, therefore, difficult for the two traditions to cooperate as they both undermine and rely upon the other. Testable scientific theories are not very appropriate for IR and this is because of the dialectical nature of its subject matter. As argued in chapter 3, a subject is not made a science by its methods but rather by a fruitful relationship between its methods and its subject matter. Thus a correct understanding of the relationship is crucial.

A resolution in IR, then through science seems unlikely as it does not adequately acknowledge the dialectical conflicts inherent in its nature. Another attempt at resolution can be seen in the cognitive perspective which both emphasises the importance of the subjective whilst also claiming to incorporate the technical or the objective. Research within the cognitive perspective can be interpreted as an analysis of some of the conflicts in IR and efforts to resolve them, as for example seen in the work of Ingwersen (1992). Although he places himself within the cognitive tradition, his work is also an attempt to

combine the techniques of the physical tradition with an understanding of the human aspects of information. He argues that the cognitive approach is a combination of the traditional physical approach (in terms of techniques) and the user approach. Thus, in his view, the cognitive approach is not an alternative to the physical approach. It is, rather, a way of incorporating both the importance of IR techniques and the user. He wants to broaden IR out from its traditional focus on techniques to include a wider understanding of information but without abandoning work on techniques.

> "The fundamental aim for research in IR shifts from a maximisation of retrieval performance by means of refinements of IR techniques and methods of text representation *within IR systems* to maximisation via understanding of user behaviour and information need representation during retrieval." (Ingwersen, 1992, p.57)

Ingwersen claims (1992, p.190) that he is looking for a "unifying IR theory based on contextualisation". Thus the cognitive tradition is seen as one which can include both the subjective and objective aspects of IR. It can, therefore, actually be seen as a proposed solution to the subjective/objective divide in IR rather than as a proponent of the solely subjective. He is trying to incorporate the objective or the physical approach into the cognitive tradition, thus this can be understood as desire for resolution through a kind of enforced assimilation. It is not clear that this is really successful because it is so hard to both collect data on user experiences and then to use them to inform techniques of meaning representation. As Ellis argues (1992a) the cognitive tradition's claims to model and understand the subjective experience of information have not translated into the improved performance of IR systems. This has also been observed more recently by Hjorland (1997, 2000a, 2002), who criticises the *ad hoc* nature of user studies. In general the data in IR (Sparck Jones, 2000, 2004) tends to lead to the conclusion that most improvements will come from statistical techniques which do not even include much reference to what we would recognise as meaning, never mind the individual cognitive experience of the user.

Interestingly, from a dialectical perspective, Ingwersen's view is that a universally important theoretical feature of IR is the problem of relevant unretrieved documents. He refers to these unrecalled relevant documents in IR as the "dark matter" (1992, p.54) of IR in the sense that they themselves are not perceived but their effects are. Thus in a sense IR is unified by its concern with 'what is not' and how we can know about it. As discussed in the chapter 6 the use of the dialectic in philosophy is also concerned with the problem of 'what is not' and how we can meaningfully talk about it without becoming mired in contradictions. Un-recalled documents in IR are both information because they are relevant (or least about the query) but also not information because they have not been retrieved (they have not affected the knowledge state of the user). Indeed retrieved relevant documents can also be information because they are relevant (or at least about the query) but not be information (in terms of affecting the knowledge state of the user) because, for example, he or she has already read it or it is out of date. They can also, as Oddy (1977) was one of the first to acknowledge in his work on anomalous states of knowledge, be both relevant and irrelevant during the same search process as the knowledge state of the user changes

Does the dialectical model provide a better metaphor for this problem than the evocation of dark matter? In some ways it does because it can show how the pertinence of what is retrieved is also dependent on what is not retrieved. Unretrieved relevant documents are also both similar to the retrieved documents (they will almost certainly share some subject matter) but also not dissimilar because they have not been retrieved. Thus they could be said to be alike or related by meaning, but different or not related as information, because the unrecalled document will not inform a user. In IR the way the documents can be both similar but also behave differently in terms of either being found relevant by the user or retrieved in the first place is an important conceptual paradox which also has practical implications. A dialectical understanding of how 'what is not' can be the opposite but still be strongly related to 'what is', can provide a theoretical context to this apparent contradiction. This can also be seen in the relationship between information and redundancy as discussed recently by Warner (2003) in terms of communication. Information relies on that which is not information, i.e. redundant

information that fails to change a knowledge state but whose existence makes it more likely that a knowledge state will be changed, i.e. that the message will get through. The dialectical model is then not only useful to IR as a way of analysing the complex and contradictory nature of its conflicts but also a way of analysing the way it relies on 'what is not'.

So far we have analysed both an appeal to a more scientific methodology and arguments for a unifying cognitive approach as proposals for mitigating or resolving the divided research tradition within IR. Another approach is the use of Wittgenstein's (1953) later philosophy and, in particular, his emphasis on the role that social practice and context play in minimising the conflict between the subjective and the objective within meaning. As already discussed in chapter 2 Wittgenstein's own philosophy exists in a tension between unity in meaning at the moment of use and diversity in meaning on a theoretical level. He argues that we have a tendency to think that there is conflict at the moment of use (we think we need to interpret what the other person is saying and forget that we normally instinctively understand) and also to believe that there is a unity in meaning at the abstract theoretical level. In fact the opposite is the case. Thus his work cannot really resolve the divide in IR theory, or at least, it could only do so by saying that theorising about IR, in terms of general and abstract laws, is futile. There is also a conflict between Wittgenstein's treatment of spoken language and IR's reliance on recorded information. This means that IR is abstracted from the very context and practice that Wittgenstein argues is essential to meaning.

This analysis of the theoretical debate in IR reveals the importance of conflicting perspectives and their relationships. There are attempts to resolve these conflicts either through the dominance of one perspective and/or efforts to incorporate both the subjective and the objective. Theoretical perspectives in IR, in so far as they argue for the supremacy of the subjective or the objective, can be understood in a similar way to the different philosophies of meaning discussed in chapter 2. They try and explain meaning by negating the importance of either the subjective or the objective. This means there is no longer any need to account for the nature of the relationship between them. This is,

however, unsatisfactory and only manages to give a partial account of meaning. It would appear that, in order to make sense of meaning, the importance of both the subjective and the objective need to be acknowledged. The relationship between them, however, remains a difficult one to understand. The dialectical model offers a way of understanding it as a relationship of mutual antagonism and dependence. This tension can, to some extent, be ameliorated by an appeal to context and social practice. For IR, however, this option is of limited use because IR deals with meaning out of its original context; meaning in IR has to be represented. This representation is objective in the sense that it is part of the physical world but its purpose is to enable a subjective experience of information in a user. Perspectives in IR which emphasise the importance of the objective and the physical tend to focus on techniques of meaning representation and measure their success in terms of recall and precision in test collections. Thus the subjective judgement of relevance, which is normally done by experts, is assumed to be valid and not often held up for critical discussion in the work. The tradition that emphasises the subjective, in contrast, places a lot of focus on how users in particular situations perceive relevance. It is not seen as a fixed relationship between a document and a query but as a result of a combination of other factors including the knowledge state of the user and context or task that the information is for (Borlund and Ingwersen, 1997). This acknowledgement of complexity, however, does not, in itself, provide practical solutions about incorporating this into techniques of meaning representation within an IR system.

In my view, IR's current approaches to resolving the conflicts within its subject matter do not work because the important differences and potential conflicts between the proposed means of resolution and IR are not addressed. The subject matter of science is different from IR, an IR system works in a different way than the mind (and we don't know much about how exactly) and the subject matter of social practice philosophy of language is the spoken word which is different from the normally textual nature of IR. Thus, in general an increased acknowledgement of conflict and difference aids conceptual clarity and an understanding of these theoretical relationships as dialectical in nature provides a useful way of making sense of their complexities. Ingwersen's proposal for a universal aspect of IR theory in terms of the "dark matter" or un-recalled relevant documents can be

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understood as an appeal for unification through a dialectical relationship between 'what is' and 'what is not'. Thus theory in IR can be characterised by complex conflicts and a reliance on 'what is not' and the dialectical model can provide new insights into their nature.

The next section looks in more detail at the hypothesis that these conflicts in IR theory have proved very resistant to resolution and argues that an understanding of why this is the case can also be improved using the dialectical model. Evaluation or testing in IR is normally the way in which it is claimed that different theoretical perspectives in IR are tested against one another. This then normally requires some kind of implementation of methods of meaning representation or some kind of analysis about how users respond to these techniques. What is the nature of the relationship between theory, meaning representation and testing in IR and why, so far, has it failed to provide conclusive answers on the best way to represent meaning or the best theory to explain why?

7.2 Meaning representation

This section analyses the question of whether meaning representation can usefully be understood as a conflict situation and, if so, whether the conflict is dialectical in nature. This is done by firstly examining the nature of meaning representation and then by assessing the extent to which certain problem areas in meaning representation become clearer when they are seen as a product of a dialectical conflict. The implementation of particular meaning representation techniques is sometimes done in order to try and resolve a conflict about which IR model is the most effective. So far, comparing these techniques has not produced conclusive results about which one is the best. I argue here that this is partly because meaning representation is an inherently paradoxical and contradictory process. There is a conflict at the core of meaning representation. Thus, as in IR in general, the conflicts and relationship in meaning representation are characterised by a complex mixture of mutual dependence and antagonism.

Meaning representation requires that meaning has some kind of relationship to information. In order to make meaning into information, in terms of placing it within

some kind of information system, it normally has to be represented in some way. Representation is a process that involves both hiding something from view, in terms of reducing its complexity and size, and devising a way in which it can be found, in terms of highlighting its most pertinent aspects. Thus meaning and its representation are, in fact in dialectical conflict with each other. Both concepts are defined, to an extent, by what they are not. A meaning representation of a document points to or refers to something beyond itself (the actual document). The problem is, as Wittgenstein argues, that this pointing process requires a social context in order to work well. In one sense the problems of meaning representation are just a reflection of the problems of reference and representation theories of meaning. In Fregean terms it is fairly easy to get the correct reference (i.e. point to an object or document that does have that name or indexing term) but it is not so easy to get the correct sense (or ensure that the document will actually match or be relevant to the subjective mental needs of the user). If the reference theory is wrong, and the questions that it raises arise from a faulty understanding, then this would go some way to explaining why meaning representation is so problematic. I argue that the reference theory is correct in terms of meaning representation but not in terms of our ordinary use of language and that it is this conflict which makes meaning representation difficult. Most IR systems operate on the assumption that meaning is reference (a document is about a query if it has a certain textual relationship to it) but, in practice, meaning has different aspects (such as context) with which the actual user is operating. Thus meaning representation operates within the constraints of the reference theory of meaning but, in terms of retrieval, it has to go beyond these constraints. Meaning representation in IR operates in a way that removes it from many of the aspects of meaning (and information) which, in our ordinary use of meaning and language, tend to reduce the power of these conflicts and differences. Thus an understanding which sees meaning as a process of dialectical conflict, examines how these conflicts emerge and are heightened in IR, and investigates how these conflicts may also be central to IR, can work to uncover the nature of a number of difficult persistent problems in meaning representation.

Both meaning and information then contain a number of conflicts within them and it is also the case that there can be conflict between them. In IR a full and detailed representation of the meaning of the document may, for example actually hinder a rushed and novice user in finding the document and/or in gaining information from it. A query and document representation which were very similar in terms of meaning would not result in a useful or informative retrieval for the user as he or she would already know about the contents of the document. Thus for a document to provide information about a query it must both be different enough from the query to provide new information and similar enough to be relevant. In contrast, for a document to mean the same thing as a query it must be as similar to it as possible. Indeed two identical documents would share exactly the same meaning.

Representation is also a conflict decision in terms of the decision about what is kept and what is jettisoned. The terms in a document which are then kept need to be ordered or given weight in terms of their significance. Much work on meaning in IR is often about trying to reduce the isolation or shortcomings of this textual representation by either providing information on textual context, for example in NLP when the position of a term in a sentence is given, or on social context (Blair,1990; Blair and Kimbrough, 2002; Brier, 1996), when possible uses of the document are provided. Another approach is to try and improve communication between the IR system and user (Ingwersen, 1992). Representation then seems to often involve the removal of meaning in one sense and also attempts to replace what has been removed. It exists in a tension between the possibility of being stored and the possibility of being found. The representation of meaning then can be understood as a dialectical activity carried out on a dialectical process.

Part of the reason that it is difficult to use the implementation of meaning representation techniques to ascertain which model of meaning is correct for IR is because the process of meaning representation is just a reflection of the conflicts that already exist in the models. These theoretical conflicts are very hard to resolve because they concern meaning and meaning contains many tensions and conflicts that defy resolution. Meaning, as discussed in chapter 2, has a number of different aspects, primarily the

subjective and the objective. If meaning is to work then there must be a relationship between these different aspects. It can be difficult to understand how this relationship works, however, because the subjective and the objective appear to be so different in their nature.

Meaning representation is then both difficult and problematic. The question under consideration here is whether the dialectical model can make a useful contribution to our understanding of why this may be the case. This will be done by looking at particular difficulties in meaning representation and then analysing them in terms of the model by assessing the extent to which they are a product of a dialectical relationship. I argue that most of the difficulties in meaning representation can be understood as problematic relationships and that, in most cases, they are problematic because they are dialectical in nature. This is therefore essentially an analysis about the nature of the relationship between the different aspects of meaning representation. What kind of relationships make up the process of meaning representation and to what extent can they be understood as part of the dialectical relationship between the subjective and the objective?

7.2.1   The problem of ambiguity

The first and perhaps most fundamental problem with meaning representation is the difficulty of possible multiple interpretations or ambiguity. What is the nature of the relationship between these different interpretations? The possibility of differing interpretations relies upon the subjective/objective divide. It is only possible because there is difference between what is 'out there', both in terms of the world and other people's view of it, and an individual's own inner subjective experience. Blair (1990) argues the problem of ambiguity or indeterminacy is of central importance to IR. Brier (1996) also stresses the importance of what he calls "unlimited semiosis", as does Mai (2001). This issue is seen in slightly different way by Ingwersen (1992) who argues that "isness is fundamentally different from aboutness" (p.53) and by Belkin (1981) who proposes that IR should focus on why the meaning of a text (textual content and structure) may be different from what it is about (topic). A dialectical perspective reveals that not only is 'isness' different from 'aboutness' but that whole concept of 'isness', as discussed in chapter 6, is often paradoxical or different from itself. Thus it is not as if the

'isness' or the 'being' of the document is totally straightforward but that its 'aboutness' is not. It is also not valid to say what a document is in a way that can totally exclude what it is about and *vice versa*. Indeed, it doesn't really make much sense to try and understand 'isness' and 'aboutness' in meaning as if there was somehow a possibility that they were not related. What a document is about is not some kind of incidental predicate about what it is, but an essential part of what it is. They are different but they are also inextricably linked and in many ways this relationship appears to be dialectical one. The differences between them make ambiguity possible but the relationship between them makes meaning possible.

In terms of IR this kind of ambiguity, or the potential gap between what a document physically is and the ways in which it can be subjectively interpreted (what people may think it is about), is a central issue. Can indeterminacy or the existence of differing interpretations be understood as a conflict situation? What are the different aspects of meaning which make indeterminacy possible and how could they be related?

In terms of text it would appear that, as long as they can be clearly perceived, there can be no possibility of disagreement about the actual words and their grammatical structure. Thus, in this very limited sense, what a document 'is' is straightforward. In dialectical terms, however, it 'is not' this 'isness' because its existence would simply make no sense without its relationship to semantics or 'aboutness'. Words as physical entities are not open to dispute as long as they are clearly written and people are able to see and read them. Thus the objective aspect of meaning in terms of text is not really a candidate for explaining the possibility of indeterminacy. If there is disagreement about the physical contents of text or information in another medium this can normally be resolved by, for example, retrieving the original document from which perhaps an unclear copy was made. The problem is more difficult to resolve when it arises from the possibility that different people will have different subjective experiences of the same text. Thus they will read the same text but have different interpretations of its meaning. The possible reasons for this difference in subjective experience are numerous. There could be historic reasons in terms of what a particular person has already read and understood about the

subject matter. There could be social reasons in terms of the social or professional group a person is in, which could affect their knowledge of terminology. There could be pragmatic reasons which mean that the document will solely be assessed on its ability to help solve a particular problem, even if, for instance this is only a small part of the document. There is therefore, not a deterministic relationship between text and meaning. There is both a gap and a relationship.

> "There is duality between the form and meaning of words. The same form of words can have different meanings in different vocabularies and the same meaning can be expressed by different forms of words." (Buckland, 1999, p.5)

In terms of meaning we know that meaning must be shared to a fairly great extent or language wouldn't be possible. In IR, however, we often find that people don't understand the meaning of documents in the same way. In particular there is the problem of the different ways that indexers or authors view the meaning of the document versus the ways in which users do. Indeed Blair (1990) argues that this dichotomy is the central problem in IR. It is though perhaps more than a straightforward dichotomy as many different groups and technologies are involved in the production of information and there are, in fact, many differences in interpretation within these groups, for example indexers, as well as between them. Thus IR relies on the fact that meaning is generally shared between these groups, or IR would be totally impossible, but its effectiveness is limited by the fact that it is possible for this sharing to be very imperfect and fragmented. At the same time it relies on the richness of this diversity of interpretation or it would just be simplistic data material. If we want to retrieve information rather than just data then the raw materials must be more complex.

How then are we to understand the relationships between these different possible interpretations of the meaning of the text and the relationship between the different constituencies who are dealing with the text? Is it possible to see it as a network of relationships of dialectical conflict? This problem can be brought back to Parmenides's paradox introduced in chapter 6: how can the one be many? For Parmenides accepting

this contradiction was evidence of error: the one can never be many, so despite outward appearances, existence is unified and unchanging. Thus dialectic was used as an argument to show that one had to accept existence was unified as, accepting the alternative that reality was many, forced one into a contradiction. Parmenides reminds us that the existence of diversity in unity is conceptually problematic even though we appear to see it all around us. The outward appearance of IR certainly does give the impression of the possibility of multiple perspectives on the same subject matter. I argue that this is not an illusion based on a failure to see an essential unity; rather it is an inevitable consequence of the dialectical forces at work within meaning. The tension between the subjective and the objective makes these different interpretations possible but, as it is also a dependency relationship, it simultaneously works to limit their scope. Thus different people can have different interpretations because they are individuals, at the same time, these interpretations will be related, because they are also part of a social group.

Ambiguity is an important feature of meaning because it enables it to be fairly flexible and to portray an enormous variety of different things. In order for meaning to operate effectively, however, it must have some limits because if words are not generally used consistently then they can't have meaning. This is the major thesis in Wittgenstein's arguments about the importance of rules in meaning and their enforcement through consistent use. Thus the problem of ambiguity in meaning can be seen to exist in tension between a useless anarchy of unlimited interpretations and an overly rigid and inflexible structure. Indeed languages that have no ambiguity, such as logic, are not too useful for describing and discussing human issues. Thus ambiguity is possible because there is some separation between meaning and what it represents. Limitless ambiguity, however, is not possible because, in Wittgenstein's view at least, there is a strong shared connection in our communal rules of language use. He argues that agreement in language is an agreement in a form of life. Frege also distinguished between the shared social understanding of 'sense' in meaning and specifically argued that this should not be understood as a private mental 'idea'.

The dialectical model can help us make sense of ambiguity by revealing it as a product of the dialectical relationship between the subjective and the objective in meaning or, to put it another way, between what meaning is and what it is about. Ambiguity is possible because there is gap between these two aspects of meaning. Another perspective on this conflict is the tension between the individual or subjective in meaning and the collective or shared nature of meaning. Meaning must be collective or it can't work as communication but it also contains the possibility of differing individual interpretations. The conflicts between both different philosophies of meaning and also different theories of IR can be understood, in one sense, as viewpoints on whether it is the separation or the connection in language which is of most significance. In IR this relationship is even more complex because information requires both difference (in order to actually change or add to knowledge) and similarity (in order for this to be recognised and communicated).

The problem of ambiguity or indeterminacy in meaning can be seen, then, as a product or manifestation of the dialectical conflicts within meaning. IR, because it also deals with information, has a particular kind of relationship with this conflict. If we interpret ambiguity in meaning as part of a dialectical conflict how does this make the problematic nature of meaning representation clearer? In order to examine this question the different aspects of the meaning representation process will be discussed in terms of what separates them or their possible differences. The main separation in the process of meaning representation is often assumed to be (Ingwersen, 1992; Blair, 1990) the gap between the people or the algorithm which represents the meaning of the document and the user who is representing his or her information need as a query. As discussed in chapter 5 this process can be seen as a communication process which is more characterised by separation (in terms of, for example, time, space, possible understanding, context) than by connection. Blair (1990, p.190) cites Zipf's work (1935, 1949) arguing that his insights into the nature of communication can help IR. According to Zipf communication is a process existing between the competing economies of the speaker and the listener which can be understood as the forces of unification and diversification. The result of this conflict is that a vocabulary balance is achieved whereby the speaker must use more than one word in communication but is allowed to

have multiple uses of many of them, and the listener gives up his rigid economy of one to one correspondence between words and meaning/usage and tolerates the use of individual words for several different jobs. This vocabulary balance means that the total effort of the speaker's expression and the listener's understanding of language is at a minimum (if either the speaker or the listener prevailed then the total effort would be higher for both).

> "The high degree of orderliness of the distribution of words in the stream of speech points unmistakably to a tendency to maintain an equilibrium on the one hand and what may be tentatively called variety on the other." (Zipf, 1935, p.48)

Blair suggests that these observations can be used to make IR communication less unsatisfactory but Zipf, like Wittgenstein, is discussing speech so its application to text may be restricted. If Zipf is right then communication in any sense can be understood as a situation involving conflict which may reach an equilibrium in the "stream of speech" whilst IR is normally concerned with recorded text. Thus, in actual use this conflict can be resolved or mitigated. This, however, becomes much more problematic in IR.

The reason why this kind of conflict is perceived to be a problem for IR is that it can result in the user having a different interpretation of meaning than the one provided in the IR system, either by an indexer or an algorithm. This matters because the user may not use the same terms to describe the meaning of documents, which they would find relevant, as the system has used to describe documents which, in terms of its algorithms or indexers, are relevant. If this is the case then relevant documents will be missed and some irrelevant ones will probably be retrieved. Thus documents which do in fact share meaning with the query (which the user would find relevant) are not recalled because, even though they share meaning in this sense, they do not share meaning in terms of the IR system because, different terms have been used to describe the document. In terms of the Fregean distinction between sense and reference the indexer and the enquirer could be said to share a reference (they are actually referring to the same document), or at least the user wants to refer to the same document, but they have different senses. These different senses mean that the terms used to describe or represent the meaning of the document are

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not the same as the ones used to formulate a query in order to retrieve it. This results in an actual failure to share reference (the same document is not retrieved). In one sense the user and the system fail to realise that they are both talking about the same thing. This process is complicated by the fact that, in most cases, users are not necessarily looking for a particular document but rather a number of documents about a particular subject matter. Users are not, in contrast to indexers, normally trying to describe a particular document; rather, they are trying to describe their information need in a query. So there is a difference between the 'system view' of the document and the 'user view' and this difference is a conflict to the extent that it has undesirable effects on the ability of users to retrieve relevant documents. Indeed Blair (1990) argues that it is very difficult for a user to think of all the different ways in which the type of documents they want may have been represented and that this is a "major obstacle" (p.53) for the user to try and overcome.

There are then many different ways to describe or interpret one subject area and there are also many different ways to describe or interpret even a single document. As well as the separation between the indexer and the user there is also the separation between different indexers and different users. The problem of indexer inconsistency is identified by Salton and McGill (1983) as being a good reason to use automatic indexing techniques. Different users will also describe similar information needs in different way and also will make different relevance judgements about the same pairs of documents and queries (Voorhees, 2000). It also possible for one user to change his or her perceptions of relevance during a particular IR interaction (Greisdorf and Spink, 1999; Greisdorf, 2000; Greisdorf and O' Conner, 2002; Oddy, 1977).

Different interpretations are therefore possible because, even if the text remains the same, there are differences between the subjective experiences and contexts between indexers, between indexers and users, and between users. These differences are not solved by the use of automatic indexing because there are also differences between how different authors will write about similar subjects. I argue that these differences can be understood as operating in a dialectical relationship. Different interpretations require both

similarities, they must be different interpretations of the same thing, and also difference, or there would be no disagreement. The existence of different interpretations reveals both what is subjective and individual in meaning and also what is objective and shared in meaning.

In IR there is a divide between those that think one should resolve ambiguity through one correct representation based on context (Blair, 1990) or science (Hjorland, 1997, 2000a) and those who seem to embrace ambiguity by providing multiple perspectives on documents as seen in Ingwersen's (1992) proposals for poly-representation. There is then a tension between the desire to avoid ambiguity and the desire to incorporate different interpretations within IR. This could be seen to reflect the fact that ambiguity is both a weakness in IR as it can make it hard to find documents but also a strength as it allows the possibility of different perspectives on the same subject matter. There is also an interesting tension between Ingwersen who seems to argue for a generic IR system but containing multiple meaning representations and Blair and Hjorland who argue for multiple IR systems, one for each group, but with limited and context based representations. Thus the tension between unity and diversity in meaning exists in both these approaches but they put them in different places.

Blair argues that meaning should not be understood as the text of the document but the way in which the document is used. He is using Wittgenstein's arguments that at the time of the actual use of a word there is not room for ambiguity. One document, however, can mean different things to different people or groups if they are using it in different contexts and in different ways. He argues that this potential ambiguity makes it hard for people to use IR systems because they are often not searching for the document in the same way that it has been indexed. In his view this problem can be reduced if the context or possible use of the document can become more incorporated in the indexing process. It can also be reduced by restricting the scope of IR systems: he argues for specialised IR systems for particular user groups rather than the use of generic systems. This restriction to specialist groups should make it easier to align the indexing process with the search process. If there is only one particular context and limited uses then ambiguity should be

less problematic. A similar approach is advocated by Brier (1996) who also draws on Wittgenstein's work and by Hjorland *et al.* (2003b) who argues for the importance of different domains or specialist groups in IR. The argument for all these different domains has some similarities to Plato's arguments for a divided world in order to remove the conflict between the general (or abstract) and the specific (or concrete). In both cases an attempt is made to reduce conflict and possible contradictions by creating separate spaces.

Thus, here we see a perspective which is arguing that meaning can often be open to different interpretations in the abstract but that in specific and actual use it is rarely open to different interpretations. This is certainly part of Wittgenstein's arguments about meaning; he is arguing that meaning only appears perplexing when we examine it in an abstract or pure way. We are often tempted to think too much about meaning and this leads us astray; if we examine carefully how it is used then it will no longer appear puzzling. Wittgenstein, in contrast to Plato, rejected the whole idea of the subjective/objective divide, and solves conflict and paradox, at least in his later work, by never looking at abstract issues. The apparent conflict between the subjective and the objective only has power over us when we distance ourselves from our ordinary everyday use of language. In this context meaning does not have to be something that it is not; there is a unity between use and meaning. The question I want to raise here is "What happens to this unity when we take meaning and put it into an IR system?". If we accept Wittgenstein's arguments that conflicts within and about meaning can be resolved through the actual use of language then to what extent can this assist us in IR? I argue that the main way it can assist IR is to reveal the ways in which IR is distant from the type of language use that Wittgenstein is discussing. IR has to be different or it wouldn't be IR, yet at the same time, it has to strive towards the shared context of use as this helps enable effective retrieval.

This tension between unity and diversity in meaning representation also has an interesting, and perhaps dialectical, relationship to different theoretical perspectives in IR. The ambition for a unified theory, as is seen in Ingwersen's (1992) work, is combined

with a diversity of meaning representations whilst a Wittgensteinian or diverse view of meaning is combined with the desire to reduce ambiguity through locating it in specific contexts. Hjorland (1997, 2002), for example, argues for a diverse approach to meaning like Wittgenstein and also for one prescriptive way of representing meaning based on current scientific knowledge. Blair (1990) also uses Wittgenstein's arguments on the diversity of language use but then argues for the incorporation of context and use into meaning representation to reduce ambiguity or to provide unity in meaning between indexer and user. The reduction of ambiguity, however, also results in the loss of diversity as it eliminates some possible interpretations. Wittgenstein's arguments about meaning are also a complex mixture of claims that meaning is universal in so far as we all share one form of life and also very diverse in that it incorporates many different language games. Indeed, his own concept of language games incorporates both these aspects of meaning. In my view the complex and often dialectical relationship between unity and diversity in meaning is one way of analysing why ambiguity is so complex and hard to resolve.

Ingwersen's desire for a unified (in terms of a synthesis between the subjective and objective) theory for IR is combined with a thesis that there should be multiple ways in which meaning is represented (i.e poly-representation). He also argues that the existence of this diversity can result in a unity between the indexer and the users in a particular retrieval situation. Thus, if the right method of meaning representation can be chosen for a particular IR interaction then there will be a shared view between the various participants:

"The task of IR and IR systems is to bring cognitive structures of authors, system designers and indexers into accord with those of the information worker, and the user, at the *event of searching*." (Ingwersen, 1992, p.39)

"Wormell (1984) argues that inherent in this concept (of aboutness) a conflict exists between what readers regard as the aboutness of a document and what indexers define as aboutness. In order to minimise this conflict and to obtain *general ideas* of what kind of knowledge a particular IR system should presuppose to accommodate its users, one may

suggest carrying out *empirical investigations* of potential users*'* preferences, as suggested by Ingwersen and Mark Pejtersen (1986). In addition, knowledge of such preferences may guide the functionality of an intermediary mechanism which models and serves *the individual's needs.*" (Ingwersen, 1992, p.52)

Here we have a proposal to minimise conflict by the use of empirical data to produce general ideas to serve individual needs. I would argue, however, that the relationship between the three components of this proposal seems to be based in conflict rather than one which is likely to reduce conflict. Users studies, as Hjorland observes (1998a, 2000a, 2002) have not resulted in adequate generalisable knowledge about how users interpret IR systems, and the translation of this knowledge, even if it existed, into individually tailored IR systems would be problematic. It would require the knowledge to be both general and specific which appears to be more like a description of why IR is so difficult rather than a proposed solution. General ideas are capable of both reducing conflict in meaning because they are abstracted from particular contexts but also increasing it because they do not have a particular context to ground them. The problem of how general ideas relate to specific instances has been shown, in the discussion within this dissertation, to have occupied philosophy from Parmenides to the present day. General ideas are themselves problematic rather than a solution to the problematic nature of meaning. In Ingwersen's arguments one can observe the many different conflicting aspects of IR but, in my view, a failure to see the nature of their relationship as one of dialectical conflict rather than just straightforward opposition. There is also a dialectical conflict within his own thesis between the need for a unified IR theory based on context and the need for multiple perspectives on meaning. Context is both a source of diversity, in that the same text may be interpreted differently in different contexts and of unity, in that knowledge of a particular context may resolve an ambiguity in meaning.

Ambiguity then exists in meaning because of the complex and non-deterministic relationship between the different aspects of meaning. The problem of ambiguity in IR is a manifestation of the nature of meaning and it is made more problematic because meaning is represented in IR. My thesis is that one way of understanding the   nature of the complex relationship between different aspects of IR *vis a vis* meaning representation

is as one of dialectical conflict. The dialectical model provides a method of understanding the nature of these conflicts and why they are both not totally destructive to IR and yet also very hard to resolve. Their nature can be understood as the result of the dialectal tension in meaning between the objective and the subjective. Meaning has to operate on both these levels and they are dependent on each other as well as being in conflict. Our individual experience of meaning relies on our public life but there is often the possibility that our own experience of meaning may differ from those around us. There may be more than one possible interpretation and thus there will be some level of ambiguity. Different interpretations can be understood as different viewpoints on a document, which exist in a dialectical relationship. Each interpretation will rely on aspects of opposing interpretations. These differences are not too destructive because ambiguity is a product of the way meaning always requires some similarity and consistency. They are hard to resolve because meaning also alters, to some extent, relative to particular individuals and contexts.

Ambiguity is, therefore, one important and difficult problem for meaning representation, which I have argued, can be understood in a new way using the dialectical model. The model can also show how it is connected to the problem of theory in IR, in terms of meaning, because a theory can also be seen as a resolution of ambiguity. As such, it is has similar problems of creating a stable synthesis in a dialectical conflict.

7.2.2   The problem of the general versus the specific

The other problem for meaning representation, which I argue is amenable to dialectical analysis, is the extent to which it should be specific or exhaustive. Exhaustive indexing means that the broad concepts and general ideas in the document are represented, thus it can be seen a way of emphasising how a document is like other documents which fall under the same broad categories. Specificity refers to the use of detailed and focused index terms, which can be seen as a way of focusing on how that document is different from other documents that may fall under the same broad category but differ in detail. Thus there is a distinction between trying to represent the meaning of a document in its most general sense and in trying to represent it in as much detail as possible. In most cases the use of specific indexing terms increases precision, as more of the documents

retrieved are relevant, and the use of exhaustive indexing terms increases recall, more of the relevant documents in the collection are retrieved. These two aspects are not, therefore, in themselves, in conflict. If indexing is both exhaustive and specific then normally this will result in high recall as well as high precision. The use of both is known as deep indexing.

> "The dual characteristics of exhaustivity and specificity are sometimes subsumed under the notions of deep and shallow indexing. Deep indexing implies both high exhaustivity and specificity and hence a good retrieval performance. Shallow indexing, on the other hand, is produced by using a few broad terms to characterise each document. In these circumstances, the retrieval performance may be expected to suffer somewhat, but the indexing task may be performed more rapidly and more economically." (Salton and McGill, 1983, p.55)

Thus there is a trade off between the speed and complexity of the indexing process and the success of retrieving documents. There is not, however, necessarily a trade off between exhaustivity and specificity. The use of both can increase both recall and precision. Recall and precision, however, even though they can be increased simultaneously, do eventually tend to operate as a trade off. Thus in meaning representation there is not necessarily a conflict between the general and the specific but in retrieval there does appear to be. Can the dialectical model provide any theoretical context for this?

One possible perspective is that this is because meaning representation is just concerned with meaning but at the retrieval stage the primary focus is on information. Meaning representation is generally abstracted from the use of the document but at the point of retrieval there is a specific time and situation for which it is required. In the case of meaning representation the antagonistic aspect of the dialectical relationship is weaker than the unifying one and the reverse is generally true at the point of retrieval. At an abstract level unity can be maintained in meaning (i.e. it can be both general and specific). At the time of use, however, it contains both less conflict, in that it clearly has one meaning rather than another, but also more, because other alternative interpretations

have been rejected. Thus it is clearer and less ambiguous but at the cost of the loss of other possible interpretations.

In meaning representation, then, there are many conflicting and contradictory forces at play. I have argued that these forces can, in many cases, be understood as dialectical in nature. The difficult and complex nature of meaning representation becomes clearer when it is seen in this way because it enables an understanding of how its contradictory aspects are able to simultaneously co-exist whilst also often having conflicting properties. The problem of ambiguity or conflicting interpretations can be seen as a reflection of the dialectical relationship between the subjective and the objective, in particular in terms of the relationship between the individual and the collective group/s. The problem of indexing, in terms of a focus on the specific or the general, can also be seen as the product of dialectical relationship. These problems also include dialectical concerns about how the one can be many in terms of the relationship between general ideas and concrete instances. All these issues, and the conflicts they contain, are raised in the problem of testing or evaluation. Sparck Jones (1981, 2000) argues that the difficulties in IR testing are caused by something fundamental about the nature of IR. My thesis is that the fundamental nature of IR is one of conflicts and contradictions and that these can generally be understood as a reflection of a dialectical conflict.

7.3 **Evaluation and testing**

In this section I analyse whether the difficulties in IR testing can be understood as conflicts, and if so, whether they are dialectical or not. I argue that there are clear conflicts both between different research methodologies (qualitative versus quantitative) and between the different meaning representation techniques which are often the subject IR tests. My argument is that both these conflicts are closely connected and that they are both manifestations of the dialectical nature of meaning and information. In a similar way to IR work in theory and meaning representation it is possible to interpret research methodology in IR as different approaches to the dialectical conflict between the subjective and objective. A dialectical interpretation can clarify why these conflicts are so persistent (because they are irredeemably antagonistic), and why despite this, there is

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such a strong impetus to resolve or synthesise them (because they are also irredeemably inter-dependent).

The central question examined here is the apparently paradoxical nature of IR testing. In IR why does testing and evaluation, normally seen as way of solving conflicts and differences between techniques, models and theories, only seem to reveal and create more conflicts and paradoxes for IR? Indeed the very title of this section reveals a tension between subjective evaluation and objective testing.

This conflict between the two main methodologies in IR testing is between the qualitative approach of the cognitive tradition and the quantitative approach of the objective tradition. This is normally assumed to be the main division in testing methodology. I argue, however, that what is most interesting about this divide is its relationship of dependence with its supposed opposite. The objective tradition can best be understood by revealing how it relies on the subjective and *vice versa.* It is the conflicts within these traditions, revealed in their relationship with their opposing faction, that are most important to understand in order to improve conceptual clarity about testing and evaluation in IR. Thus an understanding of the dialectical nature of meaning representation and the dialectical nature of theories of meaning can help explain why IR testing has neither resolved conflicts between opposing techniques or progressed towards resolution on the best theoretical approach and methodology.

In terms of resolving the conflict between different models and techniques of meaning representation IR testing has not proved too successful. I argue that this is because of the dialectical conflicts within the process of meaning representation. It is also because of the dialectical nature of the models, particularly when they claim to be theories, which produces a conflict between claims made about what is being tested and the actual substance of the experiment. The relationship between the model and the technique is also often not clear. Thus in general within IR testing there are many relationships at work which are not operating in the way often assumed by the experiment. The relationships are, in fact, dialectical but the experiment provides one with the impression

that they are quantifiable and scientific in nature or, to put it another way, that a synthesis is both possible and potentially informative.

This section analyses this argument by examining the extent to which evaluation in IR can be understood as a process involving conflict and, if so, whether or not these conflicts are dialectical in nature. The objective is to ascertain whether the persistently problematic nature of IR evaluation is partly a manifestation of the dialectical conflicts that it contains. My thesis is that both the conflicts in methodology and technique can be understood as a product of the dialectical conflict both within and between meaning and information.

The process of evaluation or testing in most disciplines is normally a method of resolving conflicts and ascertaining whether x approach is actually better than y approach. In IR, however, it is source of dispute rather than a resolution of dispute. Whether it is called evaluation or testing it is normally the process of trying to resolve the conflict between the limits of the methodology and the complexity of meaning. This activity is problematic because of the conflicting nature of theorising *per se* in IR and secondly the dialectical nature of the fundamental concepts. Thus evaluation is ensnared by concepts which struggle against quantification and definition and this results in a subsequent lack of clarity about what is being tested. The lack of a clear view of theory also makes it difficult to know why something is being tested. The relationship between theory, technique and result is often not clear and this, in my view, is at least partly because of the dialectical nature of meaning and information.

I argue, therefore, that evaluation and testing in IR are very productive at revealing conflicts within IR but rather ineffective at resolving them. This is because the subject matter under investigation, information and meaning, is not the kind of thing about which theoretical closure can be achieved. It will always exist in the struggle between the subjective and the objective. Thus it is not possible to show through testing that IR is either subjective or objective. It is not possible to use subjective or qualitative methodology without relying on the objective and it is not possible to use objective or

quantitative methodology without relying on the subjective. Evaluation and testing do reveal interesting things about IR but this is normally to be found by analysing their relationship with the very thing they claim to reject or, alternatively, by examining the ways in which they are not what they claim to be. Thus evaluation and testing in IR can be understood using the dialectical model both because of the nature of the conflicts which they contain and also because of their relationship with what 'they are not'.

My argument is that the difficulties in IR testing are not so much problems of methodology, although these problems do exist, but rather a problem at a conceptual or theoretical level. It is to do with the fundamental nature of what is being tested rather than in the detail of the different ways in which it is tested. There is a difficulty in IR, as Blair (1990, 2000), Buckland (1991) and Hjorland (2000a) observe, because tests have, so far, failed, to offer conclusive results on which is the best IR meaning representation model. Blair argues that it is because of failures of methodology. In terms of reliability there is a problem, in his view, with accurately measuring recall (in a large document collection it is very hard to measure how many documents may be relevant to a particular query). In terms of validity there is a problem about whether the experimental context actually relates to 'real life' IR. I argue that, whilst some of these criticisms are certainly valid, this failure within testing reveals a more fundamental difficulty and that it can be understood as a failure to resolve a dialectical conflict. Indeed the problem of failure to resolve conflicts in IR is perhaps most apparent in the area of testing and evaluation.

Testing theories, at least in science, is normally the arena in which conflicts between different theories are resolved by ascertaining which one has the best fit with the data. My thesis is, as has already been argued, that this approach does not work for IR because it does not have theories in the scientific sense but rather models. These models can be most clearly understood through an understanding of what they are not, i.e. they are not explanatory theories. These models are ways of interpreting the data and all these interpretations can be seen as valid in the sense that they are not the kind of thing that can be falsified by the data. As there are no theories there is no explanation and thus no closure or possible synthesis. This also means that it is possible for the various different

models in IR to exist simultaneously in the discipline. Thus IR deals with issues, such as meaning and information, which are essentially contradictory but they are contradictory in such a way that one cannot perform an experiment or test and demonstrate that one perspective is incorrect and the other one is correct. It is not possible to choose because both elements of the contradiction rely upon their opposing element for their existence whilst at the same time existing in opposition to it. They exist in a dialectical relationship of conflict and mutual dependence. This appears to be true both in terms of different meaning representation techniques and also, in more general sense, between the different research traditions within IR. They are in conflict in one sense, for example the traditional and the cognitive traditions have very different approaches on the importance of the user, but, at the same time, these both continue to do useful work in IR. It does not seem to matter that one had not totally superseded the other.

So can the dialectical model assist in understanding not only why there is both conflict between IR models, as has already been discussed in section 7.2, but also why this conflict does not seem to be the kind of thing that can be resolved through empirical testing? In order to examine this question it is first necessary to look at the relationship between models and techniques of meaning representation. Generally in IR what is being tested is a particular meaning representation technique, this is more common in the objective tradition, or how the results of this technique are interpreted or experienced by the users, which is more common in the subjective or cognitive tradition. The assumption normally running through the debate on IR testing is that it is possible to either say meaning is objective, meaning is subjective, or that both can be happily combined in a synthesis. Firstly we will examine the possible role of dialectical conflict within the traditional approach, which favours the objective, and then proceed to examine its influence in the cognitive tradition, which favours the subjective but also makes claims about a possible synthesis.

7.3.1   Conflicts within the objective tradition

Within the traditional approach, if there is a specific model behind a technique, it is normally a mathematical or logical model of language or information, for example the probabilistic model (Robertson *et al.*, 1997). It has proved very difficult to come to any

firm conclusions about which technique is the best and the question of finding out why is often not addressed (Sparck Jones, 2000). Indeed, often different techniques have very similar recall and precision levels even though they may actually retrieve different documents. The only general recommendation arising from these large-scale tests of various techniques is that the use of relatively simple statistical techniques tends to perform as well, and normally better than, as the more complicated natural language techniques. Thus within the objective tradition in IR, which is characterised by its focus on techniques of meaning representation rather than the effects these have on the subjective experience of the users, there are a number of different techniques which all seem to work reasonably well. They often retrieve different documents but their performance in terms of recall and precision is comparable. Thus there is conflict between these techniques in so far as they offer different rationales and ways of selecting terms but there seems to be no way, or indeed no need, to make a firm decision about which one is superior and then jettison the rest. One of the reasons for developing the large-scale test collection of TREC was to provide a universal testing ground for various techniques. The overall results from these comparisons has not, however, been to clearly demonstrate superiority of particular techniques but rather a broad similarity in performance between most of the participants.

It would appear that these different techniques and their associated models are all valid in the sense that they all represent particular aspects of the meanings of the documents they analyse. These differences can be seen in the way in which different techniques often retrieve different documents in TREC (Sparck Jones, 2000) but the similarities can be seen by the fact that their recall and precision results are fairly similar. This suggests that, even if some of the individual documents differ, they are generally about the same kind of thing. Thus one way of interpreting the TREC data is to see it as a reflection of the importance of both difference and similarity in meaning and the impossibility of making general definitive decisions about the meaning of documents. In one sense these different techniques seem to offer conflicting interpretations of document meaning and, in another sense, they are offering a shared interpretation. This is a dialectical process in so far as it both involves conflict and difference but also a relationship of shared meaning.

These different models all represent different aspects of the meaning of documents. All these different aspects combine to constitute the meaning of the document. They are in conflict in so far as they offer different interpretations but also in a relationship as they are bound by the way in which meaning limits interpretation. If one understands meaning as a dialectical process it is not surprising that different techniques of meaning representation are both in conflict and also strongly related. It is also not surprising that this conflict can't be resolved because their mutual dependence is a reflection of many different elements which exist in meaning.

The objective tradition can therefore be said to contain dialectical conflict in so far as it works to develop techniques that represent the dialectical process of meaning and then tries to decide which ones work best. Both of these ambitions can be understood as an attempt to synthesise or resolve a dialectical conflict. It also contains a conflict at the very core of its methodology. The reliance of large-scale test collections, such as TREC, on subjective relevance judgements introduces a semantic and subjective element to the experiments that could be seen to undermine their apparently objective nature. These relevance judgements, which define which documents are about which query, must be made by either one person or a fairly limited number of people and must be fixed. In actual IR situations the relevance of a document to a query varies both between users and at different times for the same user (Greisdorf and Spink, 1999; Greisdorf, 2002; Oddy, 1977). Thus, relevance decisions in IR are made by large numbers of different people at many different times and in many different contexts. There is then a tension between the pragmatic restraints of the test collection and the actual nature of IR. In order to build a test collection fixed relevance judgements have to be made about which documents are about which queries in order to enable recall and precision to be measured. These provide objective, or at least stable, criteria in so far as all the techniques are tested against the same collection using the same relevance judgements. Thus it is possible to compare the techniques consistently against that particular collection but whether this is actually a valid reflection of how users would interpret the retrieved documents, which tends to be unstable, is difficult to ascertain. The results may be reliable within the confines of TREC

but is not clear that they are valid because the relevance they test may not actually translate into users how would interpret relevance in the actual use of the IR system. The paradoxical nature of objectivity in TREC can be understood as a reflection of the paradoxical nature of objectivity *per se.* As the philosopher Nagel (1986) argues, in some areas of enquiry, and meaning and information appear to fit into this group, an objective perspective actually takes one away from a true (or one could say objective) understanding because an understanding of a 'point of view' is essential to what one is studying. Thus any attempts to remove this 'point of view' in the name of for example, scientific reliability, actually negate or seriously diminish the value of one's investigation. The striving for objectivity actually reduces objectivity in the sense of decreasing knowledge and understanding of what one is studying.

This issue of how to judge relevance is part of the general problem of measurement in IR. Measurement is the process of ascertaining the extent or quantity of a thing by comparison with a fixed unit or with an object of known size (Oxford English Dictionary). It normally resolves conflict, for example by showing that x is in fact bigger than y. The problem for IR is establishing a fixed unit to compare the success of different IR systems. Within TREC the fixed unit could be understood as the relevance judgements. These are, in fact, both fixed and known, and thus can be used for measurement. The problem is whether this measurement is actually related to the thing it is supposed to measure, i.e. the way users will understand those documents. Ellis (1996) argues that measurement is intractable in IR because of the nature of its subject matter, the nature of relevance judgements and the nature of cognition and knowledge. If information and meaning are not the kind of thing that can be measured then can the dialectical model progress our understanding of why this may be the case?

Measurement requires a relationship between something which is fixed and known so that what is not fixed and known can become so by comparison to the unit of measurement. So it involves a bringing together of what is fixed and known with what is not yet fixed and known. In IR, however, there is no known or unchanging scale of measurement against which unknown quantities of meaning and information can be

compared. Meaning and information are by their very nature in a state of change and flux. The relationship between change and stability is, however, complex. In one sense meaning can only become fixed in particular situations at particular times but this determinacy will not be persistent. In another sense, at a textual level the meaning of a document does not (normally) change and is persistent but its meaning may change in terms of how different users perceive it over time. So, it is possible to measure meaning on a textual level but it is not possible to accurately and reliably predict how this will translate into meaning as it is actually used. It is also possible to fairly accurately assess how a particular user has judged the relevance of a document in a particular situation. It is difficult, however, to know the extent to which this could be generalised to all users, or to put it another way, whether this was something fixed or open to change. In one way meaning is most fixed at a textual or abstract level; in another way it is most fixed at the level of specific use in context. Thus there is paradox and a contradiction at the centre of the problem of measurement in IR. The very thing that one is measuring against, whether it is the objective tradition's fixed relevance judgements or the cognitive tradition's user experience is itself in change and flux but is also, in one sense, fixed. I argue that measurement requires a productive relationship between what is known and fixed and that which is not known and fixed which can then increase knowledge. In IR, however, the relationship between what is fixed and what is unknown and changing is a dialectical one and this is why it is not possible to accurately measure it.

The TREC experiments then, despite their scientific appearance, have a fundamental difficulty in producing generalisable results because of the tension between accurate measurement (reliability) and meaningful results (validity). It is the very impetus to be objective and scientific, partly through the use of fixed relevance judgements to provide consistent data, which undermines the validity and ability to generalise from these tests. This objective methodology in IR still relies on subjectivity and it would appear that this subjectivity is an essential part of its subject matter, meaning and information, rather than a rectifiable oversight in experimental method. It is not at all clear how it could be possible to make relevance judgements both reliable and valid. The test collection methodology of the objective tradition is therefore unable to resolve the conflicts between

different techniques of meaning representation and it is also unable to resolve the conflict between the subjective and the objective in IR despite the apparently scientific nature of its experiments. It does not manage to expel the subjective from IR. The dialectical model can help explain both why there is strong impetus to solve these conflicts, because of the antagonism between the different elements of meaning, and also why it fails, because of the mutual reliance between the different elements of meaning. Thus the difficult relationship between the subjective and the objective in IR is, in fact, not so much between the qualitative and quantitative traditions but within them.

There is also conflict within the objective tradition of IR testing between whether it is testing in the scientific sense, with the aim of finding out why certain techniques have certain effects, or in the technological sense, with the aim of finding out what works and then improving it. Oddy (1981, p.166) argues that if a test result is good it can be an engineering success but a scientific failure if you don't know why. In this case the performance of the system has been tested but not the assumptions or theories which may underlie it.

I argue that this tension between the desire for theoretical rigour and the desire to develop systems which simply work well, even if it is not clear why, can be understood as a reflection of the dialectical nature of meaning and also information in IR. Meaning operates both on an abstract level and on a pragmatic level and the relationship between them can be problematic. Developing general theories of meaning, as Wittgenstein reveals, is often in conflict with developing an understanding of the diversity of the ways that we actually use meaning. The tension between the pragmatic and the scientific in IR could also be a reflection of the possible conflict between meaning and information in IR. Within IR the meaning of a document is represented in order to enable it to serve an information need. Thus any technique of meaning representation has a purpose; it is not just about capturing meaning in itself but capturing it for use. This purpose will be related to the meaning of the document but it may sometimes also be at odds with it, as it will require a simplified and reduced version of that meaning. Thus within IR's core subject matter there is a conflict between meaning in an abstract sense and the specific way in

which meaning becomes information in use. This issue can be related to the work of Heidegger (1959) who argued that there is a tension between a poetic understanding of language (as a thing with intrinsic value) and the "enframing" of language for a purpose which turns it into a technology. He particularly argued against information theory's perspective on language because it resulted in natural language being seen as an imperfect version of a formal ideal. Thus turning meaning into information, which is really the purpose of IR, is seen to have negative effects on the quality of that meaning. The tension between research for knowledge for its own sake, perhaps in the form of science, and research for a usable technology that is present in IR may be a reflection of the deeper tension between the nature of meaning and nature of information.

Within the objective tradition in IR there is then, both a general failure to conclusively resolve conflict about which is the best model and technique for meaning representation and a fundamental paradox or conflict at the centre of its methodology, in so far as it claims to be scientific and also relies upon subjective relevance judgements. There is also an uneasy tension between its role as an explanatory science or a pragmatic technology. I argue that the nature of these conflicts can be clarified by seeing them as a manifestation of the dialectical nature of meaning, information and the relationship between them. This helps explain both why there is conflict and why it is not possible for it to be conclusively resolved. The dialectical model can also be used to show how, in IR testing, an insight into its nature is gained when one examines its reliance on the very aspects of meaning and information that it claims to reject. Thus in a dialectical sense the way it approaches what 'it is not' is very revealing. The objective tradition often makes claims about its scientific credentials and its ability to provide objective criteria. This discussion has shown, however, that the best way to actually understand the nature of these large-scale test collections is to reveal how these are the very things which they cannot succeed in delivering.

7.3.2   Conflicts within the subjective tradition

Dialectical tensions also exist, in rather similar ways, within the subjective or cognitive tradition of evaluation. The development of the cognitive perspective was partly a response to a perceived gap between the actual experience of IR and the experimental

techniques of the objective tradition. Thus in one sense, the cognitive methodological approach can be seen as a recognition of a conflict between the objective methodology and the nature of IR. It is, in a similar way to its theoretical perspective, an attempt to synthesise the subjective experience of information with the objective handling of information within an IR system. Its testing and evaluation methodologies are different from the objective traditions in so far as what the objective tradition tends to regard as peripheral in terms of the nature of relevance decisions and user experiences, the cognitive tradition regards as central. It has different goals and normally uses the term evaluation rather than testing. In general the concern is more with qualitative experience of IR rather than the quantitative results in terms of recall and precision. If, in terms of the dialectical model, the aim of IR testing is to resolve conflict between techniques by showing which is best then the aim of IR evaluation is often to resolve conflict between systems and users. This is done by finding out more about how users perceive systems and information and then using this to improve system design.

So in one sense the cognitive approach to evaluation can be seen as an acknowledgement of a conflict which the more quantitative tradition tends to overlook: the possible difference between the meaning of the document in terms of its text and whether it actually informs the user. As has been discussed the text is normally unchanging but the other aspects of meaning such as subjective interpretation and context can change. This in turn affects the meaning of the document in terms of how it is experienced even if it remains physically the same.

Ingwersen (1992) in particular stresses the importance of IR systems having some kind of intermediary function which facilities 'communication' between the 'system view' of a document and the 'user view'. This desire, however, to bring users and systems closer together through the collection of evidence about user behaviour has not, so far, produced substantial gains for IR. In some ways it is conceptually clearer than the objective tradition because it does acknowledge the possibility of different interpretations and conflict within IR. There do, however, seem to be limits to the extent to which just finding out more about this actually contributes to a solution. A dialectical understanding

of how these conflicting interpretations and perspectives within IR systems are both essential to meaning as well as being destructive can help explain why this may be the case.

In a similar way to the objective tradition, the cognitive tradition has an uneasy relationship with the aspects of meaning and information that it regards as less important. The cognitive tradition emphasises the importance of the subjective (the user perspective) and, in one sense, appears to suggest that its potential conflict with the objective (documents) can be resolved through better system design. Thus it is trying to synthesise what 'it is not' into its model. In practice, however, this is difficult to achieve because computer systems do, in general, process meaning and information in a different way from humans. Indeed, it seems reasonable to argue that there is an inescapable difference here because of, as the cognitive tradition often emphasises, the essentially subjective and qualitative nature of human experience. If their claims are correct then they undermine the likelihood of the transparent communication between computer and user which is their proposed solution. It also brings into question Ingwersen's claims to distinguish the cognitive tradition from cognitivism. He may well rely on some of the tenets of cognitivism in terms of implementation and the very position, which he conclusively rejects may be required for his model.

The cognitive tradition, then, tries to shift the focus in IR testing from resolving conflict between different techniques to resolving the conflict between the system and the user. This new focus is certainly helpful but it has not, so far, managed to achieve the kind of synthesis between the subjective and the objective, which the tradition often appears to claim is possible.

This discussion on testing and evaluation in terms of dialectical conflicts reveals the difficult and contradictory concepts and their relationships within this process. These exist both within and between the subjective and the objective traditions and thus cannot be seen as the failings of particular methodologies but rather as a reflection of the dialectical nature of IR's subject matter; meaning and information. I argue that it is in the

testing of IR that many of its inner conflicts are forced to the surface but also, in terms of the rhetoric of the experiments within the objective tradition and the assumption of possible synthesis in the subjective tradition, required to stay hidden at the same time. It can, therefore, in fact tell us something fascinating about the nature of IR's conflicting and paradoxical nature. It is this, rather than the relative performances of the various systems or the exact nature of users' qualitative experiences, which is the data of interest.

7.4 Conclusions

This chapter has analysed three problematic areas of IR, theory development, meaning representation and testing or evaluation, with the aim of testing the utility of the model as a tool for increasing conceptual and theoretical clarity in IR. The hypothesis under investigation was that most of these problems could be interpreted as conflicts and that, in most cases, the conflict would be dialectical in nature. I have argued that these problems can be better understood when they are seen as expressions of the dialectical conflict at the centre of IR; the one both within and sometimes between information and meaning.

In terms of the problem of theory in IR a new understanding of both the dialectical nature of theorising about meaning and also the dialectical relationship between the subjective and objective tradition has been provided. The continuing dissatisfaction with theoretical development in IR, and also perhaps in IS, can now be interpreted as a frustration with attempts to create a stable synthesis in a subject matter which cannot contain such a synthesis. Thus theories in IR exist in a dialectical relationship and I have argued that an accurate recognition of this process is the most appropriate conceptual framework.

Meaning representation has also been analysed as a conflict situation in terms of both the possibilities of ambiguity and the tension between the general and the specific in describing the meaning of a document. In a similar way to IR theory, much work in this area can be seen as an attempt to create a synthesis between these opposing forces. Unlike in IR theory, there has been some success in this area in so far as it is possible to be both exhaustive and specific when representing a document. At the point of retrieval, however, these conflicts seem to be persistent in terms of the relationship between

precision and recall. Indeed, I argue that they are probably essential, as well as often frustrating for IR, because the differences and conflicts which are their cause, are also necessary in order to create change and therefore information. The problem of testing and evaluation is, in my view, the arena in which all these conflicts are most apparent. In one sense the whole enterprise of testing and evaluation tends to assume either that these conflicts are not too important or that they can be resolved. The history of IR testing, however, reveals the persistent difficulty with the contradictory nature of relevance as a means of measurement and its implications for the reliability and validity of such work.

The dialectical model can also help clarify the difficult relationships between these problems; for example in testing the problematic relationship between theories, models and techniques can be more clearly revealed using the dialectical perspective. Finally, many of these problems can be elucidated by examining the extent to which the different approaches within IR to solving them tend to depend on the very thing which they claim not to be and are almost certainly not the thing which they do claim to be. A dialectical understanding of the relationship between 'what is' and 'what is not' can help explain why stable synthesis is so difficult to achieve in IR. The nature of its subject matter, meaning and information is characterised by this relationship, which means that any position in IR which aims for synthesis will always be unstable. The aspects of meaning and information, which it either ignores or explicitly rejects, will also be essential to its position. The next and final chapter critically reviews the role and potential of the dialectical model for IR and makes some suggestions as to how it has provided a new context for future work.

8 Conclusions and contribution

The main objective of this thesis was to provide a new insight into the role of meaning in IR by analysing it in terms of a proposed dialectical relationship between the subjective and the objective. This was done by firstly reviewing meaning in philosophy and analysing the major questions that this raised in terms of the relationship between the subjective and the objective, the ways in which meaning manages to be normative, and the problems in developing a theory of meaning. It was argued that all these questions are actually different aspects of the first question: the relationship between the subjective and the objective. These 'meaning questions' were then used to analyse both the nature or meaning of information science and the role that meaning plays in it. This led onto a discussion about the role of meaning and its relationship to information in information retrieval. At the end of this review the problematic relationship between the subjective and the objective and the ways in which it was manifested both within and between meaning and information appeared to be a central issue for both IS and IR. The next and final part of the thesis introduced the dialectical model, which conceptualised this relationship as one of mutual dependence and antagonism. This model was then used to analyse a number of persistent problem areas in IR to investigate whether the dialectical model proved to be a useful tool in increasing our understanding of IR. To what extent has the model managed to achieve this aim?

8.1 Achievements

The question of how to evaluate the utility of the dialectical model is, in common with all evaluation in IR, a difficult one to answer. How can we know if the dialectical model is useful or not? This partly depends on what one might want to use it for. The proposed use of the model was to provide a conceptual framework that could improve theoretical clarity in IR by revealing more about the nature of its central concepts and how they are related. In terms of this aim I would argue that it has been broadly successful. It has shown how the contradictory and paradoxical nature of IR's concepts can be understood as a product of dialectical conflict and that their relationship with each other is one characterised by both antagonism and mutual dependence.

This provides new insights into the role of meaning in IR and it also contributes to our understanding of the relationship between meaning and information. The nature of this relationship has not been sufficiently discussed in previous work that uses the philosophy of language in IR; it is not, for example prominent in Blair's (1990) work. I argue, however, that the distinctions and differences between meaning and information are theoretically crucial for IR and that their conflation is a conceptual mistake. Thus, in analysing the role of meaning in IR, the ways in which IR is not about meaning, but is about for example, information, are as important as the ways in which IR is about meaning. The dialectical model provides both a new theoretical context for the role of meaning in IR and also a new conceptual tool for analysis. The model can investigate the ways in which meaning is central to IR, and also the ways in which it is not, and both to these contribute to theoretical clarity. Thus the importance of what something 'is not', or more specifically the complex ways in which difference and sameness may be related, is a new contribution which a dialectical understanding can provide. Whenever one uses a concept to analyse IR an investigation into the ways in which it is not about IR may also provide theoretical developments.

This emphasis on differences and possible conflicts is of general importance to both IR and IS. It has been shown that the significant differences between text or recorded meaning and the immediate spoken word are theoretically important for IR, particularly as the philosopher most commonly used, Wittgenstein, discusses spoken language rather than text. The dialectical model can help clarify how these differences need to be explored and incorporated, without a false synthesis, into our view of meaning in IR. It can, in general, provide a new understanding of how these conflicts contribute to the difficult nature of IR.

An important development is a new understanding of the relationship between 'information as process' and 'information as thing' as articulated by Buckland (1991) which is an issue than runs throughout IR research. IR appears to require some kind of synthesis between these two aspects of information but this has proved difficult. A

dialectical understanding of the relationship between 'information as process' (subjective) and 'information as thing' (objective) can show this problem in a new light. On a general level this can be done by showing that processes and things, although different in nature, are both required for change to occur. Thus, despite their apparently contradictory qualities, processes require things and things require processes; the distinction is not clear-cut. A dialectical understanding of this relationship provides a theoretical context to help elucidate how these two aspects of information both often do manage to produce knowledge change and also why this can be difficult.

The idea that IR is a process has been acknowledged by the cognitive tradition (Ingwersen, 1992; Cole, 1997) but the question remains "what kind of process?". The concept of process is very complex and raises more questions than it answers. Their focus on establishing the inner workings of users' minds has resulted in inconclusive findings because, in my view, it tends to marginalise other aspects of the process. It is not just subjective but also objective and this tension is an essential part of its nature. It is a dialectical process and this is because of the intrinsic nature of its subject matter, information and meaning and their relationship to the subjective and the objective. The philosophical investigation into the nature of these concepts and their relationships in this thesis has argued that dialectical conflict is an essential part of how they operate. So in a sense an answer has been provided to the questions "what kind of process is IR?" or, indeed "is IR a process or an object?" by revealing that there cannot be a definitive and fixed answer. IR is a process that exists in a tension between the subjective and the objective. Thus it is always shifting as a process and it is always partly 'what it is not'. The very desire to say that IR either is subjective or objective is both an almost inevitable product of the abstract abilities that meaning provides and a barrier to our understanding of meaning.

This understanding of IR as a dialectical process has been used to clarify the problem areas discussed in chapter 7: theory development; meaning representation; evaluation and testing. In all these cases the model can help show that they have proved so hard to resolve because such a resolution would require a synthesis and a closure of a dialectical

relationship, which must, because of its nature, both resist and require synthesis and closure. Thus questions which have a long history in IR such as "why is IR theory so unsatisfactory?", "what is the best way to represent meaning?" and "how can we test IR systems?" can now be seen in a different way. Rather than necessarily trying to answer these questions I have proposed that a dialectical understanding of their nature might help explain more about why they are so hard to answer.

These questions are all about relationships and, in many cases, the relationships concerned are dialectical in nature. IR theory is difficult because of the dialectical nature of meaning and information, and the ways in which this relates to the relationship between the subjective and the objective. Thus, theorising about meaning is a contradictory process about a contradictory process. Meaning representation is so difficult because it is also caught between mutually conflicting requirements. It has to operate within the confines of text yet be useful for the flexibility of thought and action. At the same time, its very abstraction from a concrete situation is essential for IR and also, paradoxically, is a requirement for a flexibility that can serve many uses. In terms of IR and testing it has been shown that work involving meaning is not really suitable for the scientific model and that testing in IR, rather than a way of resolving conflict, is often better understood as a manifestation of conflicts which can't be resolved.

The dialectical model then, has progressed our understanding of the nature of these questions and thus has provided a new conceptual framework for the ways in which meaning and information operate in IR. This framework emphasises the importance of analysing the relationships between both concepts and activities in IR and suggests that they can often be better understood when seen as dialectical relationships. In my view one of the dominant themes in IR research is that of unresolved and often unacknowledged conflict and that this is because the paradoxes and the contradictions of its subject matter have, so far, been inadequately explored. In this regard the dialectical model can make an important contribution. Future work on a theoretical or conceptual level in IR can use this new understanding of both the mutually conflicting and mutually essential relationship between the subjective and the objective. This new insight into the

long-standing debate about subjectivity and objectivity in IR provides a much needed change of approach.

It also creates an important new awareness of the relationship between the subjective and objective in meaning and information, and the tension between materialism and idealism in dialectical theories. The concepts of process and change, essential aspects of dialectical theory, are also crucial to both IS and IR. The rather difficult relationship between the cognitive and physical traditions can now not just be seen as a reflection of different theories of meaning, which has already been noted, but also as a reflection of different positions about the nature of dialectic. Do material factors, as Marx argued, change our ideas or, as Hegel argued, do ideas change the material world?

On a methodological level the model can provide some insights into a new way of doing this kind of research by clarifying some issues about the possible use of philosophy in IR. I have tried to show that the relationships between different philosophers, in both an historical and theoretical sense, are very important. This is perhaps particularly important when discussing meaning because it includes so many different philosophical problems and issues. IR and IS, because of their emphasis on information, widen the scope even further, and these topics cannot be adequately tackled by a narrow focus on a particular theory of meaning. My exploration of the role of meanings includes its relationship with the wider issues of the nature of the relationship between the subjective and the objective.

The relationship between models and theories is, I have argued, also a very important one to get right when doing work in IR. I have used insights from the philosophy of meaning to show how an understanding of this distinction is crucial for both IS and IR. Thus philosophy has been used in a different way. It has been shown how using Wittgenstein's critique of theory, rather than just his views on social practice as has already been done in IR, can help explain why it is so difficult to develop coherent knowledge of IR. It has also revealed that IR is normally a philosophical rather than a scientific problem. This means that conceptual difficulties are normally a result of an inappropriate model or way of seeing IR rather than a failure to collect data, which can be tested against theories. This is

an important distinction because an emphasis on science and measurement actually increases conceptual confusion and thus sabotages its own ambitions.

This thesis has therefore also made a positive contribution to the debate about the relationship between science and IS and IR. Of particular pertinence is a clarification about the role of paradigms in IR as discussed by, among others, Ellis (1996), Brier (1996) and Hjorland (1997, 2000a). My argument is that paradigms, by definition, cannot contain conflict but that models in IR have to. A scientific paradigm must be capable of being overthrown by conflicting data but a workable model of meaning must be able to contain multiple contradictions and conflicts because these are actually required in meaning.

Thus quite a number of things about IR which seem puzzling and contradictory appear less so, or to be more precise, it is clearer why exactly they are puzzling and contradictory, when one understands IR as a dialectical process. The problems are not resolved but the ways in which they may be beyond resolution have been brought into sharper focus. It was already clear that IR was a complex and contradictory subject area but this dissertation has made a new contribution to understanding the nature of these contradictions and complexities. It provides a new perspective on IR on a theoretical level and the implications of this in terms of research methodology. This leaves us with a clearer idea of what IR actually is, how it may relate to wider philosophical issues and how more can be found out about this.

8.2 Weaknesses

In terms of weaknesses or difficulties with this model these will be analysed from two perspectives. Firstly, in terms of the general problems with any predominantly philosophical or theoretical approach and, secondly, in terms of the dialectical model in particular.

One can challenge the central assumption of this thesis: the conviction that theory is important for IR. It is really only a minority of researchers in IR who claim that IR is

theoretically weak and unsatisfactory. This claim may not be true and if it is true it may not matter. It does not seem to matter, at least in theories that focus on language and meaning, in terms of the small incremental improvements in performance that forms the bulk of IR research. It is possible to challenge the methodology by which their performance is judged but these techniques have certainly made a very important contribution to IR. Statistically based IR, for example, is used extensively in modern web applications (Sparck Jones, 2004). A primarily philosophical work such as this dissertation does not suggest any techniques that are likely to prove more effective.

Thus the work in this thesis is limited by the limits of philosophy. As an antidote to this I have tried to be clear about what these limits are and not to make claims about possible immediate and dramatic performance improvements which the philosophical model proposed in this thesis could bring about.

On a methodological level it is also limited by the fact that it is a model rather than a theory which means that it cannot conclusively be shown to be either true or false. My thesis is, however, that this is unavoidable if one is discussing the nature of meaning. It is just not the kind of thing about which scientific claims can be made and thus it is more appropriate to develop models which are explicitly models rather than to use models as if they were theories.

As well as these difficulties common to any philosophical approach there are also some weaknesses with the dialectical model itself. Firstly, the historical review in chapter 6 revealed the complex and changing perspectives over time of the meaning of dialectic. This thesis has focused on the more recent interpretation of the dialectic as a process involving conflicting and dependent forces. It could be, however, that some of the earlier views of the dialectic could also have been fruitfully used.

The problem of meaning representation in particular may be more amenable to an analysis in terms of the earlier view of dialectic as the use of opposing arguments to reach the truth. I would not claim that there is only one true representation of the meaning of a

text but there is a sense in which the more one says about it the more meaning one represents. It is possible for meaning representation to be both exhaustive and specific and, unlike the relationship between recall and precision, there does not seem to be any kind of inverse relationship. Thus it is possible to say different and possibly conflicting things about the meaning of a document and they can all add to our understanding of what it may be about. Adding terms to a query will eventually exclude some documents from retrieval but adding terms to a document representation may not inevitably lead to any kind of corresponding loss. This may have become more the case with the development of computing which makes the use of multiple indexing terms relatively straightforward from both an indexing and searching perspective. The increasing use of full-text retrieval systems also raises some questions for the model. In this case everything is included so there is really no representation and thus no loss which can be characterised as part of a conflict. It could be that conflict is not such an important part of meaning representation as I originally hypothesised. It would appear that conflict is far more prevalent in the activity of searching, in terms of clear trade-offs, than it is in the act of representation and also, with the development of full-text systems, sometimes representation does not even necessarily take place. I have also not examined the ways in which representing the meaning of speech or image could be interpreted using the dialectical model.

The dialectical model relies on the hypotheses that the subjective/objective divide is important, that it can be characterised as a mutually antagonistic and dependent relationship, and that this plays a central role in both meaning and information. I would argue that, in the main, these hypotheses have withstood examination but that, in some cases, they may present an over simplified view. Within philosophy Wittgenstein tries to put the subjective/objective divide back in its place, so to speak, and I have tried to show that meaning as it is used in IS and IR does, however, tend to re-assert the significance of this divide. There are also those within the tradition of literary theory, which I have not really used in this thesis, who have argued forcefully against the importance of such binary oppositions in meaning. Derrida's (1967, Trans. Spivak, 1976) theory of '*différance*' argues that meaning does not depend on such oppositions, rather it depends

on the complex continuous play of connections and differences between words. In one sense this could be understood as a dialectical process because meaning is understood as a shifting relationship between connection and separation, presence and absence, but it is not a conflict between two fixed opposing forces. Thus meaning may always be dependent on 'what it is not' but this reliance on absence is not just a dialectical relationship to its opposite.

This critique of oppositions has also been used by feminist literary theory (Moi, 1985) and is seen to have political implications in terms of breaking down the entrenched and unequal opposition between, in this case, male and female. Thus one weakness of the dialectical model is perhaps its over-reliance on a particular view of how these oppositions may operate in meaning. The divide, for example, often assumed in IR and in this thesis, between indexers and users may not be binary opposition but rather a complex web of different participants including authors, librarians and others. It may also be that there are more differences between indexers themselves and between users than there may be in the relationship between the two groups. These different groups may well operate in a dialectical relationship but this does not mean that it must be a binary one. On reflection I would conclude that the dialectical relationships within meaning and information are perhaps more complex and varied than I originally envisaged. The model could have benefited from both further exploration of earlier work on dialectic, in terms of both ancient Greek philosophy, and also more recent work in literary theory.

Another weakness is that I assume that Wittgenstein is right about meaning, theory and science. Wittgenstein is used to critique the role of science and theory in meaning but his views on this particular question are not explicitly informed by an understanding of the dialectic. His work is centrally concerned with changing our view of the relationship between individual experience and the collective and physical world but a philosophical perspective that specifically articulated this relationship as dialectical may have been more appropriate. One future approach would be to adopt an Hegelian view of scientific change to explore the ways in which research in IR may or may not be related to science. Kuhn (1970) also makes the distinction between the lack of conflict over fundamentals in

science (unless it is currently undergoing a revolution) and the high level of disagreement over fundamentals in more recent disciplines such as sociology or psychology. IR seems to contain a fairly high level of conflict and the impact of this on both the possibility of a research revolution and IR's relationship to science could have been further explored. Thus, in general the concept of dialectical conflict could have been applied in more depth to the methodological issues raised in this dissertation.

8.3 Future work

The focus of future work arising from this thesis should, in my view, be to closely examine differences, distinctions and conflicts within IR. Thus in terms of further use of the dialectical model the different perspectives on what dialectic means should be explored and the ways in which these different approaches may work more, or less, effectively on IR problems than the approach so far used could be examined. The use of different philosophers, particularly those from literary theory, is potentially very interesting. The relationship between oppositions and meaning is extensively covered in literary theory (Eagleton, 1983) and, unlike the philosophers normally used in IR, literary theory is about text.

In IR there is much more scope to examine the ways in which things that appear to be different may be very similar and *vice versa.* In this thesis I have concentrated on textual IR, the model could, however, be extended to speech and image retrieval to examine if they have a similar or very different type of relationship to the tension between the subjective and the objective. I have also argued, for example, that the differences between information and meaning are crucial to a conceptual understanding of IR and the nature of this complex relationship deserves further analysis. This could probably be related to the perhaps more immediate problem of why two processes that may appear similar, representing the meaning of a document and representing the meaning of an information need through a query, do, in fact appear to operate in different ways. There is also the related question of how things that may appear to be central to meaning can in fact be peripheral and *vice versa*. This question could perhaps be applied to the problem of image retrieval where the meaning or significance of a picture can quite often appear in a small

detail. In Breughel's *Icarus*, for example, the small falling figure in the corner of the picture indicates something crucial about its central subject matter precisely because it is so insignificant. The nature of the relationship between significance and insignificance could be further explored using the model.

The importance of relationships in IR and the ways in which they manage to incorporate differences and conflicts as well as mutual dependence could, in the light of the dialectical model, form the context of further research. In my view, at least in terms of theoretical or philosophical work there should be less of a focus on closure and solutions which (it is often claimed) can be implemented and more focus on the complex role of conflict and oppositions in IR. I have argued that these conflicts and opposition are dialectical in nature but there is also scope for analysing them in terms of a different theoretical perspective.

In general, however, I think that the dialectical approach provides a fruitful context in which to explore further theoretical issues in IR. An awareness of the extent to which concepts and theoretical approaches may both rely and depend upon their opposite is a good starting point when trying to analyse the complex philosophical challenges which IR presents. The failure to acknowledge this, either in terms of reductionist claims that IR either *is* subjective or *is* objective, or in claims that these opposites can be peacefully resolved through an appeal to social practice, have, in my view hindered efforts to develop a clear conceptual and theoretical perspective.

Future work in IR then should try and bring out or emphasise its internal conflicts rather than deny or work to resolve them. An interesting new approach within the technological tradition in IR is the area of adversarial IR[2]. This field studies the various techniques which are used to manage the conflicting goals of accurate results for search providers and high positioning by content providers. The dialectical model could provide a potentially useful theoretical context for this kind of work.

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[2] A workshop on adversarial IR will be held in May 2005 as part of the 14th International World Wide Web Conference. Available from: <http://airweb.lehigh.edu/>.

One important concept in both IR and IS on which much interesting analysis could be done from the dialectical perspective is the concept of change. I have shown that a dialectical understanding of change can help clarify the nature of the relationship between meaning and information. The increasing prevalence of constant change and flux in information, knowledge and organisational structures and the possible implication for information systems, as observed by Burke (2003), are an interesting potential use of the model. What impact does a dialectical understanding of change have on how we should understand information processes and how they relate to organisations and the wider world? A dialectical understanding of change reveals the complex nature of this paradoxical concept and its difficult relationship to meaning and information. The whole question of what it means to be informed, to change from ignorance to knowledge, could be further analysed as a dialectic. An analysis of change could also be done from a more political perspective. The distinction between Hegel's idealistic view of dialectic and Marx's view of dialectical materialism is potentially very interesting for theoretical work in both IS and IR. The question of how human understanding and information interact to change things is central to both. The extent to which this should be understood as an objective physical process or as a subjective mental one is given a new perspective when it is seen as a dialectic.

Generally work in IR so far tends to be rather apolitical although, within IS, Sturges (2004) is a recent exception. The importance of the linguistic division of labour is discussed in philosophy by Putnam (1973) and in IR by Anderson (2002) and Hjorland (1997) who particularly stresses the importance of cognitive authority. The role of these divisions and how they may relate to power and conflict in society is not, however, often discussed. Does IR exist in a political dialectic between providing authorised controlled information, as Hjorland seems to suggest, and/or providing access to information that and/or providing access to information that could change society?

Information both requires some form of authority and structure for it to be collected, stored and disseminated (even the web requires the collective norms and structure of

language) but it also, at least potentially, contains the seeds of the possible destruction of that order and structure. Indeed Marx and Engel's argued that the education of the working classes, which was necessary in order to provide a skilled workforce for the capitalist society, would also lead to an increased understanding of their oppression and thus, eventually, revolution. The structures needed to support capitalism would eventually also contribute to its downfall. Meaning can also be understood as requiring both shared norms and rules but also some flexibility about how it operates within them. Thus both information and meaning require both stability and change, and there is scope for researching what kind of possible political or sociological implications this could have.

The only way to end the inherent conflict in IR would be to make it impossible for it to change things and this would negate the whole point of information. As Neill (1987, p.194) argues in his discussion on the dilemmas of indexing "We cannot change the past but information from the past can change us". In fact, in order for the past to change us it is imperative that we do not change the past. Winston Smith, in Orwell's (1949) *Nineteen Eighty Four,* spends his days adjusting and altering any records or documents which no longer correspond to the state's current view of reality. Thus false predictions are erased, photographs and all records of dissidents are evaporated; anything which could provide an insight into a conflict between the past, present and the future is destroyed. The world and its past simply become synthesised into "everything that is the case" (Wittgenstein, 1922, 1). Change then requires some kind of conflict, tension or movement and, in so far, as IR contributes to change, it is inextricably linked in with this conflict. The exact ways in which this is the case and its theoretical and philosophical implications could provide a productive new direction for IR.

9 References

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