Introduction

1.1 The scope of clinical reasoning
Clinical reasoning is a term describing the thinking and decision making processes associated with clinical practice (Higgs and Jones 1995). My formal interest in clinical reasoning - given that I had previously had an informal interest, making decisions as a physiotherapist in clinical practice for some sixteen years - goes back to an essay which was a requirement of an orthopaedics course I was doing in 1995. In that essay the principles of clinical reasoning were required to be set out. With the support of the lecturer Mark Jones (who was also to become my principal supervisor for this study), I was able to turn the essay into a reflection on clinical reasoning in different contexts. I recalled two examples of decision making in which I had been involved in previous years. These were in overseas contexts, quite different to the private rooms or outpatients departments of suburban Adelaide.

The first example was in Kabul, Afghanistan in the mid 1980s. The case involved an Afghan man in his mid forties (late middle age in Afghanistan) who was referred to me because of pain and stiffness resulting from osteoarthritic change in his knees. The diagnosis was plain enough. Indeed, so was the intended physiotherapy course of action in terms of exercises and advice. I was not prepared, however, for the questions he began to ask me regarding the types of food he would or would not be allowed to eat. One of my students hastily explained to me that in Afghan culture there was a system of ‘hot’ and ‘cold’ foods (not related to their temperature) and that these had different perceived effects on the body during sickness or ill health. I listened to this and assured the man that, apart from having a balanced diet (itself not an easy thing to achieve in that war torn land), there was no evidence that abstinence from certain foods would play a major role in his recovery, exercise and avoiding certain postures being much more important. Of course, I
'lost’ this man as a patient and subsequently saw that I ‘missed the boat’ because I had, firstly, not understood his beliefs, and secondly, had not taken them seriously.

The second example of decision making occurred in rural western Mexico (a decade or so later) in a community based rehabilitation project at which I was an observer cum volunteer. A young woman was brought to me for an opinion. Lupita, 21, had contracted poliomyelitis at an early age and, not receiving treatment until she was much older, had developed severely disabling muscle and soft tissue contractions. Her spine was sharply curved in the lumbar region and her hips were stuck, unable to be straightened out by more than ten or twenty degrees. What made the situation worse was that these contractions were pulling her spine into an ever more curved position not only causing increased back pain but a real risk of spinal cord and nerve root damage. Lupita was otherwise an attractive young woman of marriageable age and she was very concerned that her time and opportunity for happiness in this regard was rapidly passing.

It was apparent that conservative treatment could not alter such longstanding structural changes. She could be sent for orthopedic evaluation in a provincial centre some 6 hours away by bus. The advice received from local health workers and another expatriate health worker was that there were, unfortunately, many unscrupulous surgeons in that part of Mexico who would be only too happy to take the money (if it could be raised) and perform tenotomies (tissue lengthening procedures), leaving the patient with whatever the result. Tenotomies might straighten Lupita’s legs but would they lead to more function? Tenotomy without careful and appropriate splintage and diligent follow up might place shortened nerve trunks in grave danger. If Lupita were to lose sensation on top of her present problems the result would be devastating (poliomyelitis is a terrible disease but its one redeeming feature is that it leaves its victims with skin sensation intact). Even so, the hip and knee contractures were really of less importance than the severely tilted pelvis and lordotic spine. This needed expert and wise evaluation prior to any surgery. Lupita, with her double disability, the first, the result of her polio, and the second, her poverty and existence in a remote village, had no money for private orthopedic opinion in either Mexico City or the U.S. Not having had access to relatively simple rehabilitation measures when she was young had left Lupita in a seemingly hopeless position.

I learned from experiences such as these that decision making in clinical situations can not be isolated from other issues and influences. In other words, decision making in clinical
practice has to be much more than the application of scientific theory and technique (Mattingly 1991, Higgs 1992). Notwithstanding the unusual nature of these particular examples, it remains true in my experience (even within urban Australian settings) that physiotherapists work in a variety of situations which can be “characterized by complexity, uniqueness and ambiguity” (Jones et al 1995, p72). Wise action needs to characterise clinical judgements in what are often uncertain treatment environments (Cervero 1989, Schön 1983).

1.2 Problem solving in professional practice

There is a dilemma confronting professional practice according to Schön (1987 p3) between the “high, hard ground of technical rationality” and “the swampy lowland, messy, (where) confusing problems defy technical solution”. Technical rationality holds to a view of professional knowledge where “practitioners are instrumental problem solvers”(ibid p3) who through well selected technical and scientific means solve discrete, well defined problems. Schön goes on to argue that the problems of actual professional practice present as complex and indeterminate situations, often with a quality of uniqueness about them.

Physiotherapy practice is to be found in a wide spectrum of health care provision and is confronted, as a profession, with a large potential for the complex and indeterminate practice problems of which Schön speaks. In an Australian setting, consider the range of skills needed for example, to do rehabilitation amongst Aboriginal people in remote areas; or those needed to do cardiothoracic physiotherapy in an acute hospital; or manipulative physiotherapy in a private practice; or physiotherapy for children with orthopaedic problems; or physiotherapy aimed at helping retrain motor skills in adults following stroke. The breadth and variation in the skills required, as one considers the demands of each area, is vast. Technical skills apart, particular cultural, social and personal knowledge and understanding together with diagnostic, teaching, negotiating, listening and counselling skills might all play a greater or lesser role in the clinical reasoning process according to the setting in which one works. Or might it be that a different mix of clinical reasoning skills is found in therapists working in the same settings according to their own particular interests, beliefs or clinical and life experiences? Or yet again, perhaps the same therapists employ a different combination of clinical reasoning skills at different times and occasions according to the particular patient or client and their context? These are the questions which I bring to this study, none of which have been previously demonstrated by clinical reasoning research.
1.3 The need for research in clinical reasoning in physiotherapy

Within changing health care environments, health care professionals have to be skilled in making clinical decisions (Higgs and Edwards 1999). The increasing costs of health care raise the imperative of an increased accountability for the nature, type and frequency of the treatments provided to patients (Higgs and Jones 1995). Research into clinical reasoning is worthwhile because it aims to make explicit the pathway by which practitioners gain expertise, enabling them to treat their patients with optimum safety and efficacy. For reasons related to the health care climate above, this understanding of expertise is now not only desirable but imperative. Instrumental to this is the need for identification of the range of clinical reasoning skills or strategies being utilised by experts in different fields of physiotherapy. This process of identification is important as the profession considers the variety and scope of its activities in the future and seeks to answer such questions as, “How will physiotherapy define itself and its contributory role(s) to community health in an increasingly competitive health care market?” and “How can future practitioners be best educated and prepared to function in the various fields of health care in which physiotherapists operate?”

Until recently much of the limited research into clinical reasoning in physiotherapy has occurred in the orthopaedic / manipulative therapy areas (e.g. Payton 1985, Thomas-Edding 1987, Jones 1989, May and Dennis 1991, Jensen et al 1990 and 1992, Christensen 1993 and Zvulun 1993, Rivett and Higgs 1997). However, as described above, physiotherapy practice is to be found in many settings and the recognition of this fact has been an underlying factor in designing this study.

1.4 A model for observing the clinical work of physiotherapists

Jensen et al (1990 and 1992), developed a conceptual framework and observational instrument for studying the clinical work of the physiotherapist with resultant derived

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1 In Australian physiotherapy, orthopaedics and manipulative physiotherapy are often different study streams. There is, however, a large degree of overlap in their work. Both deal primarily with musculoskeletal problems, although even here there is a growing trend to term this ‘neuromusculoskeletal’ to take into account the work done in neural tension by Butler, Shacklock, Slater (1994), Keneally, Rubenach, Elvey (1988) and others. Orthopaedic physiotherapy has a role in hospital in patient and out patient work but many orthopaedic physiotherapists are also in private practice. Manipulative physiotherapists are predominantly to be found in private practice.
theory on the clinical reasoning qualities or attribute dimensions of the expert as compared to the novice clinician. Jensen and her colleagues (whose work will be expounded and assessed in Chapter 2), conducted some of the very first studies examining the clinical work of physiotherapy clinicians. Their work (over the last decade) on the acquisition of expertise by physiotherapy clinicians, which culminated in its publication last year (Jensen et al 1999), used a grounded theory approach to data collection (and analysis), and a case study method for the further analysis and reporting of their findings.

The methodology of this study follows these interpretive studies of Jensen et al (1990 through to 1999). It shares two features in common with Jensen et al’s studies. Firstly, there is the interest in studying clinical work as it occurs. Secondly, there is the development of conceptual frameworks and theory during the course of the study resulting from an interplay between data, literature, researcher and analysis. This latter feature is characteristic of grounded theory approaches (Strauss and Corbin 1994). Whatever differences exist between the studies are largely as a result of the greater size of their project compared to this one. In Jensen et al (1999), four primary researchers each studied three expert clinicians in the fields of gerontology, paediatrics, neurology and orthopaedics. In this study, which commenced in 1996 using Jensen et al’s (1992) conceptual framework ‘Attribute dimensions’ as its starting point, I observed two expert physiotherapists in each of three different fields of physiotherapy; manipulative (orthopaedic) physiotherapy, neurological physiotherapy (neurophysiotherapy) and domiciliary care physiotherapy. The main emphasis of this study is clinical reasoning while the emphasis of Jensen et al’s studies has been on the acquisition of expertise. However, there is a significant intersection between the two sites of interest, particularly in terms of how therapists learn in clinical practice.

1.5 The aim and objective of the study
The aim of this study, therefore, is to examine the attribute dimensions, clinical reasoning and knowledge frameworks of expert physiotherapists working in different physiotherapy settings; namely manipulative therapy, neurological and domiciliary care areas.

It might be asked whether the attribute dimensions of physiotherapists in orthopaedic settings, described by Jensen et al (1992), are present in other fields of physiotherapy and,
if so, do they vary in meaning or priority for those therapists and their patients? Also do those physiotherapists use differing clinical reasoning strategies or generate hypothesis categories (working hypotheses related to various issues of diagnosis and management) particular to their areas of clinical practice as has been suggested by Jones (1992) for manipulative physiotherapy? What types of knowledge might be drawn on or generated by therapists in these different areas and in what ways might this knowledge be organised or expressed?

By following the methodology of Jensen et al (1990 and 1992), the objective of this study is to generate further theory in clinical reasoning in physiotherapy through an identification and understanding of the attribute dimensions, clinical reasoning strategies and knowledge frameworks of expert clinicians in these different fields of physiotherapy. In keeping with grounded theory methodology theory is generated from the data. However, it must be said that this study also develops or extends understanding of previous grounded theory - principally Jensen et al’s work.

As suggested in the abstract, this study proposes a theory of clinical reasoning and, for that matter, learning in clinical practice which takes account of the different ways in which clinicians come to ‘know’ their patient, their patient’s presenting problem and the circumstances or factors which influence and help shape that problem and the patient’s interpretation of it. The findings suggest that there are two dialectics in clinical reasoning in these three fields of physiotherapy (and most likely in other fields as well). The first dialectic has to do with understanding the patient and his or her story as unique while at the same time apprehending what is shared in a more universal or generalisable manner with other patients (or a wider population) in that same presentation. The second dialectic relates to that interplay between the individual and the social learning which contributes to the formation of each therapist’s knowledge and to his or her conduct of clinical practice.

1.6 Outline of chapters

1.6.1 Chapter 2: an emerging dialectic in clinical reasoning in the health professions

The allied health professions have inherited the basis of clinical reasoning theory from research associated with medical education over the last three decades (Patel and Arocha 1995). Chapter 2 deals with the development and nature of clinical reasoning theory from its medical origins and demonstrates the ways in which the allied health professions (principally nursing, occupational therapy and physiotherapy) have attempted to
contextualize and refine this theory to the concerns of their own practice, resulting in a spectrum of clinical reasoning theories and working strategies. I identify a movement away from clinical reasoning conceptualised as a purely cognitive process occurring within the head of the clinician to one where clinical reasoning is viewed as an interactive process between practitioner and patient.

Those theories or ideas which have gained general or widespread acceptance in the clinical reasoning literature of allied health are discussed. Together with Jensen et al’s ‘Attribute dimensions’, they form the basis of the initial conceptual framework of the study - those ‘pegs’ on which to hang collected data from the field.

1.6.2 Chapter 3: clinical reasoning and adult learning

Chapter 3 details how there has been a similar shift in adult learning (to that identified in the understanding of clinical reasoning in allied health), from individualist cognitive and behavioural models of learning towards more constructivist models such as ‘Situated cognition’ (Greeno 1989, Lave 1988), ‘Post formal thinking’ (Sinnott 1994) and Mezirow’s (1991) ‘Transformative learning’. These models, while not synonymous, address issues concerning the relationship between learner, teacher and context. Applied to clinical practice there is the recognition that there is a reasoning (learning) process occurring not only within the clinician but within the patient as well. The challenge is, “How is one to achieve a coherence of understanding between the two reasoning (learning) processes?”

1.6.3 Chapter 4: a case study approach utilising grounded theory

In Chapter 4, I discuss the nature of the research which is required to ‘capture’ the processes which occur in actual clinical practice as distinct from more experimental or simulated conditions. A rationale and explanation of the theoretical perspectives of this study - a qualitative case study using a grounded theory approach - is offered together with an account of its conduct.

There is a distinction to be made between a physiotherapy study using qualitative methods as opposed to a sociological, anthropological, historical, psychological or some other inquiry into some physiotherapy practice phenomenon. This study is the former. At the same time it is recognised that established traditions of qualitative research like ethnography, phenomenology, heuristics, ethnomethodology, symbolic interactionism and
ecological psychology have their roots in those same disciplines (Denzin and Lincoln 1994, Merriam 1998). Therefore, while signalling a pragmatic and physiotherapy situated research design, the lack of a tradition of interpretive research in physiotherapy (see Chapter 4) highlights the need to draw on and acknowledge other traditions of interpretive research such as ethnography and phenomenology. Underlying the explicit aim of the research (which is to examine the clinical reasoning of expert physiotherapists in three different practice settings), is the further aim of understanding the individual perspectives of each therapist and the culture in which each works with “description that embeds the phenomenon (i.e. clinical reasoning) in context” (Fitzgerald 1997 p53). Therefore, whilst neither a strictly ethnographic or phenomenological study, there are some basic phenomenological and ethnographic concerns reflected here (Smith 1998, Lawler 1998).

1.6.4 The findings chapters (6 -11)
The content of these chapters is introduced in Chapter 5 together with the participant physiotherapists. The structure of the findings is based on three basic, identified modes of clinical practice: inquiry, action, and resolution. It is within these modes of practice that the various clinical reasoning strategies (defined as foci of thinking and action in particular tasks of clinical practice) find expression in various combinations with each other and also in different paradigmatic forms. The terms ‘diagnostic reasoning’ and ‘narrative reasoning’ describing inquiry, ‘instrumental’ and ‘communicative’ forms of action, and ‘principlist’, ‘casuist’ and ‘narrative’ approaches to resolving ethical dilemmas, are introduced to the reader in order to describe the dialectical nature of clinical reasoning.

The two chapters on knowledge and reasoning describe how propositional, professional and personal knowledge is socially transformed in clinical practice, with an interplay between the individual identity of the therapist and his or her participation in a practising community. I describe and discuss examples (continued in Chapter 12) of the ways in which these three communities of physiotherapy shape their practitioners and, are themselves, subject to the influence of wider discourses. Referring once more to the literature on adult learning (and also to a physiotherapy study by Martin et al 1995), I demonstrate that another way therapists learn in clinical practice is by actively making meaning of particular clinical experiences through reflection.

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2 This is a short list of examples. Tesch (1990 p58) lists some forty-five different qualitative research approaches. Alternatively, Patton (1990) list ten main traditions of qualitative research.
1.6.5 Chapter 12: conclusion and discussion

Chapter 12 summarises the theoretical model of clinical reasoning developed by the study. I conclude that the study, in one sense, develops an epistemology of physiotherapy in so much as it proffers an account of how these physiotherapists know what they know. This raises the question of what constitutes credible evidence or knowledge in clinical practice.

I consider the promise which the principles of adult learning offer in equipping physiotherapists to guide their patients in many of their decision making processes. Two possibilities for further research are then outlined. The first has to do with increasing practitioners’ awareness and sensitivity to reasoning in the various dimensions of clinical practice through attending to the various reasoning strategies. The second (following Mezirow’s and related studies) focusses on evaluating the effectiveness of communicative action through identifying the changes of a patient’s (or carer’s) meaning perspectives during the course of a physiotherapy program.

In conclusion, there is an appeal to the profession to take cognisance of the external forces which shape both the clinical practice and clinical reasoning of physiotherapy. Clinical reasoning is intrinsically linked to the responsibility of a growing profession.
Clinical Reasoning in Medicine and Allied health: shifting paradigms

2.1 Introduction
This chapter deals with the development and understanding of clinical reasoning in medicine and allied health. It is structured in four sections. I trace, firstly, the dominant influence of cognitive science on the development of clinical reasoning theory in medicine. It is this tradition which the allied health professions have inherited with uneasy attempts at assimilation into their own fields of practice. In the second section, the nature of clinical reasoning’s transition from medicine to allied health is explored. I conclude that there is a shift in reasoning which reflects an attention to issues of clinical practice which lie beyond the genesis of clinical reasoning in its original mission of teaching the skill of medical diagnosis. As a result numerous reasoning strategies emanate from the clinical reasoning literature of nursing, occupational therapy and physiotherapy. In the third section of the chapter, these are described and partially evaluated (with further evaluation occurring in the findings chapters). They form an initial conceptual framework for this study. In the fourth and final section, I discuss the work of Jensen et al (1990 and 1992) which provides not only the formative methodology of this study but strongly contributes to this conceptual framework - clinical reasoning strategies.

Section one: The development of clinical reasoning in medicine
2.2 The behaviouristic approach
Early research into clinical reasoning in the medical field focussed on the clinical skills of physicians and medical students in terms of observable behaviours related to general skills and measurable by psychometric testing (Patel and Arocha 2000). Because of its emphasis on behavioural rather than thought processes, this period of research in the area is characterised as the precognitive era (Patel and Arocha 2000) but also falls within the process oriented perspective (Higgs and Jones 2000). One of the research tools developed
in this paradigm was the simulation method. Among the first of which were Rimoldi’s tests of diagnostic skills developed in the late 1950’s and 1960’s (Rimoldi 1988). In these tests subjects were given preliminary information concerning a clinical case and then instructed to pursue their examination by requesting additional information which was provided on cue cards. Analysis of the frequency and order of questions asked, enabled the researcher to differentiate between the performance of physicians and medical students and to conclude that physicians asked fewer and more appropriate questions in a more focussed performance: “In short... as expertise increases less time and less questioning are needed” (Rimoldi 1988 p274).

It is beyond the scope of this discussion to assess the merit and validity of these particular tests or of simulated Patient Management Problem tests of which these are examples, except to say that such simulation methods were primarily developed for the purposes of assessment (Patel and Arocha 2000). Their ease of administration, one of their design criteria, suited the more practical purposes of student assessment rather than the more conceptual ones of research (Patel and Arocha 2000).

2.3 Hypothesis generation and testing
The increasing influence of cognitive psychology (the cognitive era as described by Patel and Arocha 2000) emphasised concept formation which meant, in the medical context, understanding the nature of clinical reasoning and thus the development of clinical reasoning expertise (Higgs and Jones 2000). This had as its aim, in general, to understand and account for the differences between outstanding and less outstanding individuals in a given field (Jensen 1993). Otherwise known as the contrastive method, the performance of experts was compared with novices and drew on findings from research in other fields such as Chase and Simon’s ‘Perception in Chess’ (1973) and Chi, Feltovich and Glaser’s ‘Categorization and Representation of Physics Problems by Experts and Novices’(1981). The Chess studies, in particular, influenced the seminal work, Medical Problem Solving, of Elstein et al (1978), apart from the exploration of differences between masters and weaker players, by their use of think aloud protocols to study the knowledge structures and cognitive processes at work in expertise (Elstein et al 1990). Elstein et al (1978) took advantage of the advances in cognitive psychology and information processing theory (as exemplified by the work of Newell and Simon (1972)), to pose questions about, and attempt to specify, the cognitive strategies and types of knowledge used in diagnosing patient problems. This represented a departure from the previous behaviourist approach
with its “unelaborated response as the basic research datum” toward an “effort to gain insight into the plans, intentions, and understanding of the problem solver” (Elstein et al 1990 p7). This work could be said to contain the first understanding of problem structuring via hypothesis generation in medicine (Thomas-Edding 1987, Patel and Arocha 2000) and continues to be known as hypothetico-deductive reasoning (Scott 1999).

The components of the hypothetico-deductive method are: cue or case acquisition where attention is given to initial cues (information) from or about the patient; hypothesis generation where the formulation of statements or tentative hypotheses are made concerning the nature of the problem(s); case or cue interpretation where data is collected and interpreted; hypothesis evaluation where the case or cue interpretation is continued until a hypothesis is confirmed. The process reaches its conclusion with decisions concerning diagnosis and management (Barrows and Feltovich 1987, Elstein et al 1990).

It is worthwhile restating the new directions in which this work propelled the study of clinical reasoning. The pre cognitive era had seen the research emphasis on the study of clinical decision making, using mainly quantitative methodologies and models to look at clinical reasoning “only at the points of decisions between alternatives” (Patel and Arocha 2000 p80). The problem solving model sought, using a more qualitative method than had been traditionally accepted, to examine the whole process of reasoning from the formulation of hypotheses to the reaching of diagnostic solutions (Patel and Arocha 2000).

2.4 Organisation of knowledge
Following this ‘first generation’ of clinical reasoning theory drawn from cognitive psychology theory, a second emerged which can be broadly depicted as the content (or knowledge) oriented perspective (Higgs and Jones 2000). One of the perceived weaknesses of the hypothetico-deductive method was that its proponents had not been able to distinguish between the different levels of expertise of physicians (Elstein et al 1990). The knowledge based perspective focuses on the organisation and availability of medical knowledge stored in memory (Bordage and Lemieux 1986). The more astute diagnosticians are those who are able to develop a global representation of a given case derived from the relational structure of their knowledge in long term memory. This semantic network of knowledge “embeds the meanings given to signs and symptoms as they are learned” so that “the initial hypothetico-deductive process does not determine the (diagnostic) strategy; it simply delimits the territory within which the networks of
relationships will be explored” (Bordage and Lemieux 1986 p189). Another theory of the representation and organisation of the physicians’ knowledge, in contrast to the semantic structural one proposed by Bordage and Lemieux (1986), was characterised as the use of ‘illness scripts’ initially described by Feltovich and Barrows (1984) and later by Schmidt et al (1992). Here networks of medical knowledge, which include knowledge of the pathology, clinical manifestations of the disease, variability in signs and symptoms and the constraints under which certain diseases may occur, are integrated into scripts that “are as much tied together by temporal links as they are by causal relations” and which, with experience, can build into “rich and highly elaborated” forms (Schmidt et al 1992 p239 and p246). Unlike knowledge networks these encapsulated illness scripts are ‘activated’ (i.e. recalled) as whole units and their use can be interpreted as a more advanced stage of clinical reasoning expertise (Boshuizen and Schmidt 2000).

2.5 Forward reasoning or pattern recognition
Patel and Groen (1986), using a methodology of propositional analysis which, by embodying the notion of causal networks in knowledge, seeks to unravel the relational rules contained in diagnostic reasoning, studied the ability of expert practitioners (cardiologists) to solve diagnostic problems within their own domains. Their results were to show that basic science knowledge does not contribute directly to the reasoning of expert clinicians in familiar situations. They identified a process which stands as a counterpoint to the process of hypothetico-deductive reasoning in so much that the reasoning of experts in straightforward situations appears to be “forward propagation through a causal network” or forward reasoning (Patel and Groen 1986 p107). This form of reasoning moves from a set of specific observations (i.e. pattern recognition) to a generalisation compared to hypothetico-deductive reasoning where one moves from a generalisation (i.e. hypotheses) to a specific conclusion (Higgs and Jones 2000). Patel and Groen (1986) acknowledged hypothetico-deductive reasoning or backward reasoning, as they termed it, as that process used by inexperienced clinicians or expert clinicians in unfamiliar or atypical cases. Conversely, Barrows and Feltovich (1987) propose that hypothetico-deductive reasoning is the means by which new patterns are learned and hence forward reasoning becomes possible. In any case, both methods of reasoning are likely to be employed at various times and for different reasons. Forward reasoning or pattern recognition is regarded as a faster and more efficient method in that the causal networks in the knowledge underlying the clinical reasoning are set in train, as it were, eliciting ‘if ... then’ production rules which lead to quick access of further knowledge or information.
related to diagnosis and management (Arocha et al 1993). However, this rapidly breaks down as a method if there is inadequate domain specific knowledge (Patel and Kaufman 2000).

### 2.6 Limitations of cognitive theories in medical practice

Cognitive theories, as much as they have contributed to the understanding of clinical reasoning, cannot explain all the skills seen in clinical practice (Cassell 1995, Hunter 1991, Greenhalgh and Hurwitz 1998). Barrows and Feltovich (1987 p90) restate, in a medical context, Schön’s contention (1987) that much of professional practice problem solving occurs in the lowland of swampy, indeterminacy:

Patient problems are ill-structured problems: all the information needed for the solution is not available at the outset; the nature of the problem changes as the investigation proceeds; the approaches that lead to the solution are generally not standardised but are unique to the problem; and the problem solver may never be certain that a solution has been reached.

The role of contextual factors in diagnostic reasoning was considered by Hobus et al (1987) who offered support for the notion that experienced doctors make extensive use of a different kind of knowledge, namely contextual information (not dissimilar to the enabling conditions of illness scripts described by Feltovich and Barrows (1984)), while attempting to solve diagnostic problems especially when additional information regarding the case is unavailable.

Research paradigms, other than theories of cognitive science, which explore the broader nature of clinical reasoning expertise in the multiplicity of actual practice settings have gradually emerged (Patel and Arocha 2000). The allied health professions, beginning with nursing, have taken up these alternative research paradigms in their efforts to describe clinical reasoning from the various perspectives of their practices (e.g. the interpretive paradigm used by Benner et al (1992) in nursing). How these descriptions of clinical reasoning ‘sit’ conceptually with the cognitive models outlined above is discussed below.

### Section two: Clinical reasoning contextualized - perspectives from nursing, occupational Therapy and physiotherapy.

What follows is not so much an historical account of the development of clinical reasoning in the three fields (nursing, occupational therapy and physiotherapy) but rather an
examination of the ways (both from theoretical and research perspectives) in which each has attempted to understand and employ clinical reasoning within the realities of their own practice. The term ‘contextualisation of clinical reasoning’ is used here because these strategies represent attempts to adapt, modify or even contrast clinical reasoning theory, in large part inherited from medicine, to the needs and concerns (or contexts) of clinical practice in settings within and across the various disciplines.

2.7 Clinical reasoning strategies - a paradigm shift or relabelling?
How do these newer perspectives or strategies differ from the cognitive model of clinical reasoning? Do they represent something which is fundamentally different in the consideration of clinical reasoning (a paradigm shift) or do they relabel an existing and dominant model for their own market so to speak? And what is it that proponents of clinical reasoning in these health fields outside medicine wish to capture in their approaches to clinical reasoning? The strategies, themselves, will be explored later in the chapter. I will argue that there is an overall and identifiable shift in the conception of clinical reasoning from that which has been described in the previous section for medicine.

The fields of nursing, occupational therapy and physiotherapy have been chosen because studies from other professions, such as the speech and hearing sciences, are not yet prominent in clinical reasoning literature. The rationale for looking at clinical reasoning across the three fields lies in the relative paucity of existing clinical reasoning research in physiotherapy. The majority of this limited physiotherapy clinical reasoning research has occurred in manipulative therapy / outpatient orthopaedic settings and this represents only part of overall physiotherapy practice. There is the need, therefore, to look outside the profession to experiences and insights which will supplement the current understanding and application of clinical reasoning in the physiotherapy literature. Correspondingly, other allied health professions such as nursing and occupational therapy have described explanations of clinical reasoning in their field as either incomplete (Chapparo and Ranka 1995 - occupational therapy) or not uniform (Fonteyn 1995 - nursing). Clearly then, clinical reasoning discussion and research in the health professions represent “the emergence of a shared field of study” (Jones and Higgs 1995  p329).

More quantitative methodologies such as decision analysis will not be discussed in detail. The reason for this is that decision analysis represents an approach to clinical problem solving which is regarded by some as superseded, in that it is largely behaviouristic rather than cognitive (Elstein et al 1990). The use of decision analysis has been more prominent in nursing than in occupational therapy or physiotherapy but its influence and application to clinical practice has been questioned as being either limited (Gordon et al 1994) or inappropriate (Jones 1988). Gordon et al (1994 p56) make the point, however, that to some extent quantitative and qualitative methods have converged such that the relative research roles of each are clearer: “decision theory describe(s) how clinicians should make judgements, as opposed to descriptions of how they do make judgements (information processing theory)”. An example of this convergence, in physiotherapy, is found in May and Dennis (1995), where the theory of decision making is harmonised, to some extent, with clinical reasoning theory (from the cognitive perspective) in a model for teaching clinical decision making. The hypothesis oriented algorithms of Echternach and Rothstein (1989) represent another example from physiotherapy where decision theory is combined with the ‘hypothesis generation and testing’ of the cognitive research tradition.

2.8 Clinical reasoning strategies and reasoning ‘outside’ diagnosis
Each field has research which reflects the influence of the medically developed model of reasoning, either through comparison of its practitioners’ reasoning as similar to that of physicians or by describing clinical reasoning in terms of being primarily a diagnostic process: in nursing (Jones 1988, Radwin 1990); in occupational therapy (Rogers and Masagatani 1982, Rogers and Holm 1991, Roberts 1996); and in physiotherapy (Payton 1985, Thomas-Edding 1987). Allowing for the notion that nursing, occupational therapy and physiotherapy may all make ‘diagnoses’ related to patient or client status, impairment, function and disability, as opposed to the diagnosis of disease and or tissue pathology (although on occasion they may do this, especially in first contact situations), there is recognition that practice within the three fields (and the different settings in each field) involves reasoning outside diagnosis (Higgs 1992, Jones et al 1995, Jensen et al 1999 - physiotherapy; Gordon et al 1994, Fonteyn 1995, Benner et al 1996 - nursing; Mattingly and Hayes Fleming 1994, Schell and Cervero 1993, Munroe 1996 - occupational therapy).

An important distinction has been made by medical anthropology in differentiating between the biomedical entity of disease and the meaning centred (or phenomenological) entity of illness experience (Kleinman 1988, Mattingly 1991a). The presence of these
entities in a patient presentation form a continuum from its biomedical to its phenomenological poles: the world of the patient as it were. It is the recognition of this continuum in clinical practice, in the three health professions, which has resulted in a spectrum of clinical reasoning strategies seeking to understand and address issues at various points of the patient’s experience. It is important to realise that this is no orderly or consensual model but rather a collage of many views and propositions which, nevertheless, are trying to deal with often shared clinical realities. In clinical practice, the tension that exists between the biomedical and phenomenological poles is not unlike that which exists in Schön’s view of professional practice where the high ground of technical rationality is inextricably linked to the low ground of messy indeterminacy, despite attempts to isolate them (Schön 1987).

The clinical reasoning strategies which have been identified either by research or proposed theoretically, both within and across the three health professions, are: diagnostic or procedural reasoning, interactive reasoning, conditional or predictive reasoning, narrative reasoning, teaching, collaborative decision making, intuitive reasoning, pragmatic reasoning and ethical reasoning. These strategies reflect the perceived need to attend to particular tasks within clinical practice and are discussed in the next section of the chapter. A number of definitional and conceptual issues need to be addressed, however, before the intent and nature of these clinical reasoning strategies can be judged.

2.8.1 Defining a clinical reasoning strategy
The term clinical reasoning strategy needs clarification. A reasoning strategy is a method or approach to reasoning where there is selection of a structure or organisation for one’s reasoning process (Fleming 1991b). The term reasoning process refers more to the particular goals and traditions within which research in clinical reasoning has been carried out. Examples of this are medical problem solving (which is associated with hypothetico-deduction), decision analysis and expert systems or the use of artificial intelligence. Confusion exists because the hypothetico-deductive / pattern recognition process of clinical reasoning has been the dominant model of reasoning (Benner et al 1996). This is due, in part, to the abundance of medical education and cognitive science research which has accompanied its development (as discussed earlier) and the relative infancy of clinical reasoning research in the allied health professions (Jones and Higgs 1995). Thus the clinical reasoning process has been strongly associated, indeed as almost synonymous, with the diagnostic process and the use of biomedical knowledge, firstly in medicine, and
after that in the health professions (Carnevali et al 1984, Payton 1985, Thomas-Edding 1987, Fonteyn 1991, Chapparo and Ranka 1995, Jones and Higgs 1995). Referred to variously as hypothetico-deductive, diagnostic or procedural reasoning in the clinical reasoning literature of the three allied health professions (Fleming 1991a, Rogers and Holm 1991, Jones 1992, Fonteyn 1995) some would argue, however, that it is not the only reasoning process but one clinical reasoning strategy amongst others to apprehend issues, both of problem definition and therapy or management (Mattingly and Hayes Fleming 1994, Chapparo and Ranka 1995, Benner et al 1996, Jensen et al 1999). Another view from Jones et al (1995), while advocating attention to both diagnostic and phenomenological factors in clinical practice, suggests that the hypothetico-deductive process broadly underpins these other strategies which can be considered as inquiry and/or management strategies rather than as different clinical reasoning processes.

2.8.2 Intuition in nursing: an alternative model of clinical judgement?

A defence of Jones et al’s (1995), position could conceivably be found in the notion of intuition or intuitive reasoning, found primarily in the nursing literature and described by Benner and Tanner (1987), Rew and Barrows (1987) and Agan (1987). It is also termed ‘non analytical’ reasoning by Gordon et al (1994). According to Benner and Tanner (1987) intuition is what characterises the judgement of expert practitioners in nursing. In this they questioned the use of a rational cognitive model to study nursing judgement (Fonteyn 1991) and described the following components of intuition: pattern recognition, defined as the ability to recognise relationships without explicitly identifying the various components of the situation; similarity recognition, defined as the ability to recognise “‘fuzzy’ resemblances (between cases) despite marked differences in the objective features of past and current situations” (p 24); commonsense understanding, described as a “deep grasp of the culture and language” (p25) and the basis for understanding the illness experience in diverse situations; skilled know-how which could be described as knowledge embedded in action; sense of salience where priority of importance can be rapidly, almost automatically, attributed to various situations; and deliberative rationality where judgement is maximised through the ability of not limiting oneself to a single interpretation of a given situation.

These qualities represent a holistic and desirable portrait of the expert practitioner at work. However, they can be identified in other areas of health care and by other descriptors. For example, pattern recognition, even in the form defined in this instance, has already been identified by Patel and Groen (1986). Pattern recognition, because it is ‘automatic’ in
nature and judgement appears to take place in the absence of reasoning, appears intuitive but can be explained within a cognitive understanding. Similarity recognition, as a concept, itself bears a striking similarity to the ‘illness scripts’ described firstly by Feltovich and Barrows (1984) and later by Schmidt et al (1992). Likewise ‘commonsense understanding’ here is a restatement of the ability of the expert to focus on the phenomenological aspects of a patient’s presentation (Embrey et al 1996, Jensen et al 1999). Finally, and without discussing every characteristic, deliberative rationality has the hallmarks of Higgs’ notion of ‘metacognition’ or the ability to monitor conscious thoughts (Higgs 1990). Intuition, then, although described as a distinctive form of reasoning in the nursing literature could, arguably, be considered to contain the basic components of the clinical reasoning methods and qualities of experienced and expert practitioners functioning in other health care settings.

The observation that ‘intuition’ as a clinical reasoning construct has features in common with those described in other allied health fields does not answer the question (at this point) whether it is fundamentally different to the hypothetico-deductive process or, conversely, whether it is underpinned by it. ‘Intuition’ certainly adds dimensions which are either not considered or emphasised in the cognitive medical model. These dimensions have to do with coming to ‘know’ patients and their illness experience and not just their disease. Theories from cognitive science have their limitations in this endeavour (as previously mentioned) and in the development of other elements of practice such as ethical comportment (Benner et al 1996). These themes, with reference to the interpretive work of Benner and others, will be revisited at some length in the findings chapters.

2.8.3 Hypothesis categories in manipulative physiotherapy: hypothetico-deductive reasoning beyond ‘diagnosis’?

A model of clinical reasoning in manipulative physiotherapy was proposed by Jones (1992). This theoretical perspective contained a number of new concepts on previous physiotherapy research and theory in clinical reasoning (Echternach and Rothstein 1989, Payton 1985, Thomas-Edding 1987). One was the notion that physiotherapists generate hypotheses in a number of areas of practice and not just diagnosis. This idea had been present in occupational therapy (Fleming 1991a and 1991b, Mattingly 1991a) and expressed as procedural reasoning, whereby a number of hypotheses were generated
regarding the cause and nature of functional problems while others were generated in relation to possible treatment options. Jones proposed the utilisation of a number of hypothesis categories in manipulative therapy practice: sources, contributing factors, precautions and contra-indications to examination and treatment, management and prognosis. Each of these represent a different area of examination and/or treatment in which to generate hypotheses for testing. They also form a structure by which knowledge can be effectively organised. Another important concept was that hypothesis generation and testing occurs in a continuous and cyclical manner not only throughout a single treatment session but over many such sessions if necessary; reinforcing the idea that clinical reasoning in physiotherapy is about ongoing management as much as it is about initial diagnosis. Two further points need to be made regarding hypothesis categories. Firstly, they are propositional and therefore open to revision. To this end new hypothesis categories have been introduced to further enhance the understanding of the physiotherapist of his/her patient. The hypothesis categories, mechanisms of pain (Jones et al 1994) and dysfunction (Jones et al 2000) are examples in a continuing process. Secondly, they have been postulated with the field of manipulative physiotherapy in mind. Therefore, other settings of physiotherapy practice would conceivably organise their areas of information gathering and knowledge quite differently (Jones et al 1995). This is currently untested by research but will be addressed, at least in part, by this study.

The usefulness of the hypothesis categories is related to the quality of the hypotheses (i.e. inquiry) which occurs in each of them. Would inquiry in each of these hypothesis categories necessarily elicit rich patient information from all points of the biomedical - phenomenological continuum? To that extent, could they be considered to have the potential to be regarded, at least in some instances, as reasoning strategies in themselves? For example, the category of ‘contributing factors’, when carefully and skilfully pursued, might theoretically elicit and/or address very significant phenomenological aspects of the patient’s case apart from biomedical ones.

Consider the following scenario: maintenance or recurrence of pain in a longstanding shoulder problem. This may be judged to be a result of acquired incompetency of shoulder and/or scapular stabilising muscles. In turn, it could be hypothesised that this poor muscle function, rather than being as a result of inhibition in response to tissue damage, as at the time of initial injury, may be due to longer term disuse or maladaptive movement patterns, as a consequence of attitudinal factors such as loss of confidence or fear of further
aggravation. These may have their genesis in other contributing factors such as depression at not being able to perform normal work and home duties or recreational pursuits leading, in turn, to possible alterations in self image and/or an increased pain experience for the patient. The normal equilibrium of relationships at home, socially and/or at work may be disturbed by a change in function or role on the part of the patient, resulting in altered attitudes and behaviour on his part or those around him, further feeding back into and influencing the ‘illness experience’. If one adds into this situation hypotheses of other possible influences such as age, educational and socio-economic levels (affecting employability) or ethnicity with particular personal values and belief systems, then the chronic shoulder problem has a meaning for the patient which is constructed in complexity. The extent to which these hypotheses are generated, from the inactivity of muscle through to personal and cultural belief, is a function of the therapist’s ability to attribute meaning to the information being received. If the construction of meaning is not part of the therapist’s inquiry and interaction with the patient then critical hypotheses related to management and outcome may either remain unelicited or on the table, as it were, but not understood.

2.9 How does one reason in the area of meaning and lived experience?
The scenario above highlights, in some ways, the deficiency in reasoning theory which has continued in physiotherapy, adapted as it has been from medicine and centred around hypothetico-deduction.⁴ The physiotherapy literature (Higgs 1992, Jensen et al 1992, Jones et al 1995) while advocating a broad approach to reasoning which includes the phenomenological perspective, has not yet made explicit strategies by which this perspective can be understood. Thus, hypothesis categories are primarily a means of organising knowledge (for which purpose they were developed) and not reasoning strategies. They provide a framework by which relevant knowledge and information should be sought but they do not, in themselves, provide the skills to interpret or test that knowledge or even, on occasion, to elicit it.

Apart from a relevant, organised knowledge base and sound cognitive skills, it is asserted that good interpersonal and data collection skills are essential ingredients in clinical reasoning (Higgs 1990 and 1992). Good data collection skills generally refer to the ability to generate appropriate hypotheses from both sound subjective examination and physical

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⁴ Only recent clinical reasoning theory in physiotherapy (Jensen et al 1999) has challenged this dominance.
examination techniques. However, ‘sound subjective examination’ as a definition remains unelaborated and ambiguous since it may be possible to ask technically correct or ‘protocol based’ questions but still fail to elicit important information or even fail to grasp the significance of that information which is elicited (Minichiello et al 1995). This returns us to the problem of understanding as in the shoulder presentation above.

What good interpersonal skills are is also unclear but is discussed below. Hypotheses concerning contributing factors in our patient’s ongoing shoulder problem are rooted in the various contexts or cultures of his life; home and family, work and social. Mattingly (1993 p99) writes concerning the difficulty of understanding observed behaviour in ‘cultures’ or experiences outside our own:

‘We know more than we can tell,’ as Polanyi (1962) has said. We cannot (always) simply ask people what they mean or what the cultural rules are that govern what they are doing.

In the phenomenological area hypotheses will not necessarily be elicited (let alone be testable) unless skills and knowledge outside those diagnostic and biomedical (viz. propositionally) oriented ones are employed. We are in the lowlands of messy, indeterminacy again.

Returning to the notion of what constitutes good interpersonal skills, Higgs and Titchen (2000 p29) outline a rich and holistic view of personal knowledge:

Clinicians need to develop a personal knowledge base, including a depth of self-understanding which will enable them to understand complex human desires for dignity, independence and support, to appreciate the needs and frames of reference of their patients or clients, to learn to cope with pain, frailty and human endeavour and to learn to deal with ethical dilemmas within the clinical situation.

This knowledge needs to be embedded (to use Schön’s term, 1983 p345) in clinical skill. In the context of this discussion that means embedded in a reasoning strategy for “clinical reasoning provides the vehicle for knowledge use in clinical practice” (Higgs and Titchen 2000 p23).5

One of the limitations of the clinical reasoning process passed on by the cognitive tradition has lain in the lack of patient involvement (Higgs 1992). The reason for this has been that it captured the reasoning process in terms of what was occurring inside the clinician’s head
The clinical reasoning strategies which are about to be described do indeed represent a paradigm shift, not in so much that they abandon the cognitive process, but rather because they shift the clinical reasoning process from the emphasis on cognition to include a dynamic interaction between therapist and patient. It can be appreciated, then, that these strategies are no mere cosmetic relabelling of an existing dominant model. To what extent, however, the hypothetico-deductive process (or some other reasoning process) underpins these reasoning strategies will be pursued further in this thesis.

Section 3: Clinical reasoning strategies in nursing, occupational therapy and physiotherapy.

So far I have used the notions of ‘intuition’ in nursing and ‘hypothesis categories’ in physiotherapy to demonstrate how proponents of clinical reasoning in the allied health professions have attempted to adapt clinical reasoning to the realities of their respective clinical practices. ‘Intuition’ rejects rationality as the predominant mode of reasoning in nursing, and yet, appears to retain at least some of the characteristics of cognitive science theory. ‘Hypothesis categories’, holds to ‘hypothetico-deduction’ as the primary mode of reasoning in practice, and yet, seeks to use this method to understand the patient’s perspective. Both reasoning approaches exhibit an attention to factors other than ‘diagnosis’. Such attention reflects an ongoing involvement and interaction in daily practice of practitioners with patients (and/or families or carers) in a variety of tasks. It is time to explore the nature of these ‘realities’ of clinical practice as they are expressed in the clinical reasoning literature of allied health.

It is important to remember that, although there has been a cross pollination of ideas between the three disciplines of nursing, occupational therapy and physiotherapy, these ideas have not emerged in an orderly or consensual fashion. As mentioned before, they form a collage of understandings and concerns which, taken together, however, represent the findings of an emerging paradigm in the study of clinical reasoning; namely the interpretive approach (Munroe 1995, Patel and Arocha 2000).

2.10 Narrative reasoning in occupational therapy

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5 A classification of the types of knowledge required by health professionals - propositional, professional and personal (Higgs and Titchen 2000) - is discussed in some detail in Chapter 10.
6 The interpretive approach to research is discussed further in Chapter 4 - Methodology.
Influenced by the work of Kleinman (1988), Mattingly (1991b) describes the use of narratives, both storytelling and story creation, as reasoning used to shift disability from a physiological event to a personally meaningful one. It is a form of reasoning employed by therapists to further appreciate the experience of illness and/or disability from the patient’s point of view: the construction of meaning as opposed to the formulation of diagnosis (even of a disability oriented kind). Titchen and Higgs (1995 p319) express it this way: “story-telling will facilitate the construction and creation of knowledge”. Compared to a pathological process, human action is motivated:

Narratives make sense of reality by linking the outward world of actions and events to the inner world of human intention and motivation (Mattingly 1991b p999).

Since therapists must work together with patients and enlist their cooperation to achieve the goals of therapy, they must attend to this inner world of the patient.

In a study investigating the clinical reasoning of occupational therapists, case presentations given by clinicians to their peers were seen to occur in two distinct ways: ‘chart talk’ and storytelling (Mattingly 1991b). The first consisted of recitation of biomedical data, goals and treatment strategies whilst the latter seemed to develop when more problematic and ambiguous problems or aspects of the case emerged.7 An example from a staff meeting, cited by Mattingly (1991b p999), concerned a patient with Parkinsonism. Following discussion of the pathological aspects of the disease, the therapist began to speak of a specific patient she was treating and how his wife was responding to her husband’s disability. The therapist recounted various exchanges with an apparently unhelpful and angry wife, eliciting a range of feelings and issues significantly affecting the management and rehabilitation of the man with Parkinsonism. The story identified a critical problem for clinical reasoning: How could she best treat this man given the wife’s ostensible hostile and unhelpful behaviour? It was at this point that other therapists’ experiences were triggered in the form of stories which elaborated themes raised by the initial story: an exchange of collective experience as it were.

7 This clinical reasoning study employed a methodology of collaborative ethnography described, by two of the primary researchers, as a combination of action research and anthropology (Mattingly and Gillette 1991). This large qualitative study collected data through; a) participant observation, b) in-depth interviewing of therapists (and sometimes of patients as well) and c) the videotaping of clinical sessions between therapists and patients. From this study it was concluded that occupational therapists use at least four different types of reasoning. These were: Narrative reasoning (Mattingly 1991b), procedural reasoning, interactive reasoning and conditional reasoning (Fleming 1991a). Schell and Cervero (1993) added to this list when they described a reasoning entity which they termed ‘pragmatic reasoning’.
2.10.1 The role of narrative in nursing and physiotherapy

Apart from being a way of understanding the patient and their world more fully, Benner believes that narrative formation is an intrinsic part of the development of expertise of nurses:

through experience within a socially based practice, stories and concrete firsthand experiences build narratives and memories of salient clinical situations so that one moves from the status of a novice to that of a skilful practitioner (Benner 1991 p2).

She has proposed two types of narrative: constitutive or sustaining narratives and narratives of learning. The first type:

depict situations that constitute the person’s understanding of what it is to be a nurse (p 4);

while the second nurture the relational skills required in nursing practice and are:

essential to convey and preserve knowledge about the skill of involvement (getting the right kind of involvement and interpersonal distance to fit the situation) (p 9).

There is a link here to reasoning ethically or what Benner calls ‘ethical comportment’ (p1).

In the occupational therapy study, above, therapists reported that the multiple interpretations of a clinical problem brought about by sharing of stories, facilitated reflective thinking and was an empowering experience. Likewise, Benner refers to liberation narratives which depict nurses finding their voice and breaking free of biases, whatever their source, which limit patient care (Benner 1991 pp 14-15).

Conversely, it has been reported by Kautzmann (1993) that narrative reasoning has an empowering role, particularly with older adults and their families who are susceptible to being treated in a routine, disease-focussed manner, by giving their anxieties and concerns a voice. An extension of this is the current use of narrative therapy with, for example, people with chronic pain. Employed by psychologists and counsellors, the patient or client’s story, with all its particular (and sometimes unhelpful) beliefs and meanings, is ‘re-framed’ or reinterpreted to create a new story with different understandings of symptoms and more positive ways of managing them (Orchison 1997).
Literature regarding the use of narratives in physiotherapy is quite scarce. Barry (1998) investigated the responses of fifty two undergraduate physiotherapy students to a series of questions from a hypothetical patient with back pain. The results indicated that almost all of the students’ responses contained relevant narrative elements in the categories used by Borkan et al (1991). Barry concluded that there may be a link between patients’ injury related beliefs and the explanations given by health professionals. Mostrum (1999) carried out an ethnographic study with a portrait of the clinical work of an expert neurological physical therapist, Caitlin. Caitlin was found to exchange stories with her clients. Mostrum concluded that:

stories provide an unparalleled opportunity to gain new or transformed understandings of the needs, perspectives, and experiences of patients who are ill (Mostrum 1999 p222)

2.11 Procedural, Interactive and Conditional Reasoning

Another finding of the 1986 occupational therapy study was the observation that therapists use three different types of reasoning in clinical practice. Procedural reasoning was used in addressing a person’s physical problems and devising the procedures appropriate to their alleviation, interactive reasoning was used to help the therapist interact with and understand the person better and conditional reasoning, a more complex process, was seen to reflect on and integrate the functioning of both procedural and interactive reasoning (Fleming 1991a).

Procedural reasoning was discussed in the context of diagnostic reasoning (as was intuitive reasoning) and will not be dealt with further here. Interactive reasoning, which has many of the functions of narrative reasoning, can be viewed as that reasoning process used to engage the patient in the therapeutic process. Interaction appears as humour, socialising and a distraction from treatment and many therapists believed, in the study, that others (such as administrators or insurance companies) would view it as a taking away time from the ‘real treatment’ (Fleming 1991a). And yet, the task of interactive reasoning concerns a monitoring of the patient’s feelings about the treatment, with all its potential difficult and unpalatable challenges for both the patient and the therapist. This strategy is a vehicle for the interpersonal skills and personal knowledge required in reasoning (Higgs 1992, Titchen and Higgs 1995) and is integrally related to personal values of the therapist.

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8 A review of Borkan et al (1991) can be found in Chapter 6 - Reasoning and inquiry
Conditional reasoning involves not only prognosis, as such, but working through the implications of prognosis. The therapist helps the patient envisage various scenarios for the future and this informs the choices and options for management in the present. Mattingly (1991b p1001) posits the use of narratives to this end and terms it ‘a prospective treatment story’.

Each of these forms of reasoning appeared to relate to the level of clinical expertise of the practitioner in that procedural reasoning was observed in all therapists, interactive reasoning in the more experienced and conditional reasoning in those therapists with the most expertise and experience (Fleming 1991a). Hagedorn (1996), too, found that experienced occupational therapists made both implicit and explicit predictions even in the early stages of the treatment process. This finding has been corroborated in nursing where the term predictive reasoning has been coined to describe the clinical ability of experienced nurses to anticipate patient responses and outcomes based on current and past information and previous experience (Benner et al 1996, Fonteyn 1995). Again, there is less said in physiotherapy literature on the subject of prediction. Beeston and Simons’ (1996) qualitative study of ten expert neurological physiotherapists revealed that predicting, in terms of voicing a prognosis and likely response to rehabilitation, was a significant part of their job.

2.11.1 The importance of interaction in physiotherapy
Recent physiotherapy literature highlights the importance of the patient - physiotherapist relationship towards successful therapy outcomes.9 Stenmar and Nordholm’s (1994) survey of 187 Swedish physical therapists found that most looked to their interpersonal interaction with their patients rather than their manual skills when considering the success or failure of their treatments. These conclusions, however, were not considered in terms of clinical reasoning. The only study which referred to clinical reasoning at all provided a reminder of the dominance of the cognitive tradition in the profession. Thomson et al’s (1997) study, measuring empathy between novices and more experienced physiotherapists in both a clinical and non-clinical setting, found that empathy did not necessarily increase with increasing years of experience. Amongst several other explanations, they questioned whether it was the clinical reasoning process itself that militated against physiotherapist empathy:

Is it possible that the hypothetico-deductive process of clinical reasoning is so steeped in problem solving that it interferes with attention to emotions and feelings? (Thomson et al 1997 p178).

The possibility that physiotherapists reason in other ways (like their occupational therapy and nursing colleagues) was not considered.

2.12 The need for reasoning in clinical teaching and patient education

In a survey of some 585 physical therapists and administrators of all accredited physical therapy education programs on record with the American Physical Therapy Association, May (1983) sought to determine the attitudes toward (and the preparation for) teaching as a skill in physical therapy. The results indicated that although 99 percent of the respondents believed that teaching was an important skill in their practice, only 34 percent had received undergraduate preparation for it. The lack of emphasis on this skill in physiotherapy is still bemoaned (Carpenter 1996).

Learning which is interactive rather than passive has been shown to have greater efficacy (May 1993). A reasoning strategy allied to those of interactive reasoning and collaborative decision making, is required because effective patient education requires assessing both the patient’s readiness for learning and their preferred style of learning. Indeed different theoretical and practical approaches may be needed in seeking a specific compliance behaviour from the patient. To achieve this the physiotherapist should be able to adjust their teaching behaviour (Sluijs and Knibbe 1991). Integration of various knowledge types is also required: knowledge of the specific domain; knowledge of the patient in terms of their motivation and belief systems; and knowledge of the context of the patient (Sluijs 1991b).

Differences between physical therapists’ attitudes toward patient education were examined by Sluijs et al (1993a). They examined questionnaires from 222 physical therapists and audiotaped treatment sessions of 1,837 patients recorded by therapists in non institutional care in the Netherlands. They discovered that those therapists who inform, instruct and advise their patients most are also those who follow a systematic plan of treatment and have a good relationship with their patients. They noted that the quality aspects of patient education (such as asking about patient perceptions, consideration of relational factors with the patient and a planned approach) were strongly related to the quantity of patient education. They proposed two possible explanations for this: firstly, it may be that
informing patients, as a process itself, provides for a better therapeutic relationship; and secondly, some therapists may pay more attention to all of the aspects of patient education because they:

set great value by influencing patients’ behaviour

whereas,

perhaps those who do not value behaviour modification attach more value to the technical aspects of treatment (Sluijs 1993a p112).

Chase et al (1993) used a questionnaire sent to 300 American physical therapists, to study their perceptions toward patient education. Unlike the study of Sluijs et al (1993a), patient input was not included. Interestingly, although 95% of respondents indicated that patient interaction was most important for the development of their teaching skills, 80% of therapists expressed a belief that barriers to the effective delivery of patient education came from the patients themselves. This was either through their attitudes about their illness or disability, assuming a passive role regarding therapy, emotional status, attitudes or expectations regarding physical therapy outcomes and/or cognitive status (p792). This unilateral and unidirectional ‘diagnosis’ of the difficulties of patient education causes one to question the quality of the ‘interaction’ which so many of the therapists considered vital to effective teaching.

Gahimer and Dumholdt (1996) investigated the amount and perceived effects of informal patient education carried out by some 37 physical therapists from nine outpatient settings. The entire course of treatment for one patient was audiotaped and the frequency of patient education statements in five categories (information about illness, home exercises, advice and information, health education and stress counselling) was counted. Therapists, patients and supervisors then completed questionnaires about the amount and perceived effects of these teaching behaviours. Interestingly, the therapists’ teaching behaviours rarely corresponded to their own perceptions of their teaching or, for that matter, their patients’ or their supervisors’ perceptions. This related to both the amount and the type of teaching. For example, they rarely provided patients with information about general health education and stress counselling and educational information was more often provided in the early sessions of the treatment programme and declined as the rehabilitation progressed.

There is an allusion to ontological questions in their conclusions which are pursued in Chapters 9 and 10.
Gahimer and Dumholdt’s research, with its illustrated discrepancies between actual and reported teaching behaviours, contrasts with the survey only method used by Chase et al (1993) and further highlights the need to research issues of clinical practice from an observation of actual clinical practice.

One of the clinical qualities which differentiates expert clinicians from their novice counterparts is the emphasis that they place on teaching in clinical practice (Jensen et al 1992, 1999). In the light of all the information above, one could hypothesise that both the emphasis and the ability to teach in the clinical setting is a function of the level of reasoning and clinical expertise.

2.13 Collaborative decision making as a reasoning strategy
The importance of patient involvement in decision making has been highlighted (Higgs 1992). The collaborative process has its origins in interactive reasoning. However, as the therapist progresses in the data collection process, strengthening hypotheses begin to be transformed in a way that they are understood by both therapist and patient (Jensen 1996). This transformation occurs as a reasoning process. From the mutually understood understanding of the hypotheses related to the overall problem(s), comes shared management options and commitment to the treatment/problem solving plan. This is exemplified in a model of clinical reasoning in physiotherapy (Figure 2.1- Edwards in
Figure 2.1 Cooperative decision making between therapist and patient
(Edwards in Jones 1995)
Jones 1995). In this model the therapist’s clinical reasoning is seen to be paralleled by a reasoning process occurring in the patient. That is, patients have their own ideas and interpretations of their problem(s) which have been shaped both by previous experience and through the advice received from medical practitioners, family and friends.

Recent occupational therapy literature and research in clinical reasoning proposes a model of practice which is collaborative in nature (Mattingly and Fleming 1994, and Schell and Cervero 1993). Studies of Independent Living Skills programmes by Neistadt and Marques (1984) and Neistadt (1987) found that clients in long term settings who collaborated on their treatment goals made statistically and clinically significant gains in their abilities to participate in self care and living skills in the community.

In nursing, Shendell-Falik (1990) described the development of three participatory care units in an acute care hospital in New Jersey. She compared lengths of stay for clients from a traditional medical-surgical unit with those of the participatory care units. In each case, there was a shorter stay in the units with collaboration of goal setting and treatment planning.

In a study of patients with chronic pain (Strong 1995), it was found that patient self-efficacy (that is, the belief of an individual that they can successfully perform a particular behaviour required to produce a particular outcome) was a significant predictor of overall function. Based on the theoretical work on self-efficacy by Bandura (1977, 1982), Strong advocates a collaborative approach to treatment, exercise and education. One such approach (Lorig et al 1993, Lorig 1996) has been researched and piloted over several years at Stanford University with a positive impact on self-efficacy of patients with arthritis.

The value of collaborative decision making has thus been acknowledged from both theoretical and research perspectives. However, recent research in each of the three fields suggest that there may be a discrepancy between the literature and what is occurring in actual practice. That is, collaborative decision making is not occurring in each of the three fields as widely as may be imagined (Neistadt 1995, Greenwood and King 1995, Payton and Nelson 1996). Reasons for this are not clearly understood but may include contextual factors such as practice environment (Barris 1987) which also includes factors such as cost containment (Neuhaus 1988). The educational and training processes of the professions may be implicated also (Neistadt 1995, Shepard and Jensen 1990, Hunt et al 1998).
2.14 Pragmatic and Ethical Reasoning

It has been shown in occupational therapy, nursing and, to a lesser extent, in physiotherapy research and theory proposition that the personal values of the therapist influence their clinical reasoning.\[^{11}\]

In addition, contextual factors (organisational, political and economic) that inhibit or facilitate therapy are also, themselves, considered part of the clinical reasoning process (Schell and Cervero 1993, Chapparo 1993, Barnitt and Partridge 1997). Barris (1987) noted that factors such as:

- patient population, hospital setting and department tradition (e.g. content of evaluation forms)
- tended to have more influence on therapists’ clinical reasoning than did their beliefs and attitudes (Barris 1987 p608).

Other issues such as the impact of technology and cost containment have been cited by Neuhaus (1988) as having a significant impact on clinical reasoning. It is the clash of these factors with the personal values of the therapist which can result in an ethical dilemma. The balancing of one issue over another necessitates a reasoning process which Schell and Cervero (1993) term pragmatic reasoning. The concerns of pragmatic reasoning are directed to issues beyond those presented by the patient - therapist interaction but include the therapist’s personal beliefs and values within the practice context and how these dynamics interact.

From a nursing perspective, Gordon et al (1994 p57) explain that contemporary moral issues in health care have fostered a role for the place of moral philosophy in the everyday clinical judgement of health care practitioners. The gap between the theoretical and the technical approach (i.e. between the methods of moral philosophy and the practical approach to resolution of ethical problems in clinical settings), requires a model for ethical or moral reasoning. Likewise Chapparo and Ranka state that:

- despite evidence that personal values impact substantially on clinical reasoning processes, there exists no theoretical framework within which to conceptualize ethical problems in occupational therapy (Chapparo and Ranka 1995 p98).

Discussion of an ethical framework in physiotherapy literature, in a clinical reasoning context, is exiguous. It has been lamented that:

Physical therapists ...do not seem to recognise the importance of values and ethics in everyday practice (Clawson 1994 p11).

Clawson makes this conclusion based on firstly, a relative lack of emphasis on ethics in the clinical decision making literature in physiotherapy (here she distinguishes between codes of ethics which provide principles to serve as boundaries of moral behaviour but do not provide professionals with specific answers in situations requiring ethical decisions); and secondly, the results of a study by Guccione (1980) in which there was a lack of perception among a group of surveyed physical therapists concerning choices between conflicting principles or values:

Although respondents recognised that a difficult decision had to be made in some instances, they probably had not identified it as a decision of ethical choice (Guccione 1980 p1271).

Clawson goes on to indicate that ethical dilemmas in physiotherapy are likely to fall within four categories: patient autonomy, informed consent, interprofessional relationships and resource distribution. She concludes that dealing with these dilemmas (on an almost daily basis) necessitates their incorporation into therapists’ clinical reasoning.12

As mentioned under narrative reasoning, Benner advocates the use of narratives as instrumental in helping build ‘ethical comportment’. That is, an ethic of care is learned experientially:

because it is dependent on recognition of salient ethical comportment (or thoughts and feelings fused with physical presence and action) in specific situations located in concrete specific communities, practices and habits (Benner 1991 p2)

There is created a socially embedded knowledge of what is good in practice which, according to Benner, differentiates the novice from the skilled practitioner. This would seem to strengthen the notion that ethical reasoning in clinical practice is a reasoning process, acquired with experience and implemented with skill. Barnitt and Partridge (1997) in their phenomenological study describing and comparing the ethical dilemmas reported by 8 physical therapists and 8 occupational therapists, also found that dealing with ethical dilemmas was both a skilled and stressful activity. Another finding was that physical

12 In Chapter 9 different approaches to bioethics will be considered.
therapists and occupational therapists showed differences in reasoning style with the former more likely to adopt a diagnostic or procedural style and the latter a narrative style. This idea will be discussed at later points in the thesis.

2.15 The study of clinical reasoning through an interpretive inquiry.
Plainly, the clinical reasoning strategies, discussed above, represent attention to various issues, tasks or dilemmas which occur in clinical practice in these three fields of allied health. There is still much to be understood regarding the nature of clinical reasoning and the development and expression of its expertise (Jones and Higgs 1995). One of the explanations for this existing lack of clarity may lie in the propensity for investigation of clinical reasoning outside the clinical area (Shepard and Jensen 1993, Fonteyn 1995). Such research, where one observes actual practice and where one cannot control variables to a large extent, although necessary, provides its own challenges and these will be discussed in the Chapter 4. The seminal works of Benner et al (1996) - nursing, and Mattingly and Hayes Fleming (1994) - occupational therapy, together with ongoing reference to Jensen et al (1999) are, among other work, given particular reconsideration in the findings chapters.

In physiotherapy, Jensen et al (1990) and (1992) were the first to formally study the clinical work of practitioners using an interpretive approach. It is because their methodology forms the basis for the methodology of this study and, at the same time, provides (together with the reasoning strategies outlined above) the initial conceptual framework for the study, that their early work in now expounded. Chapter 4 will describe how this work has been taken up and adapted in this study.

Section four: the interpretive studies of Jensen et al (1990 and 1992)
2.16 Jensen et al (1990) - Early interpretive research in physiotherapy
Jensen et al (1990) studied the work of eight physiotherapists, with varying levels of experience, in adult outpatient orthopaedic settings. An initial conceptual framework representing the components of the physiotherapy practice environment was developed from a review of the literature and analysis of data collected during pilot observations. The first level of the framework represented the components of the physiotherapy practice environment which included characteristics of both the physiotherapist and the client such as age, gender, sociocultural background, level of experience, educational level, clinical interests, personal traits and values, expectations for therapy and prognosis. Also in this first level were organisational factors such as type of setting, payment system,
geographical location, support personnel and time constraints. The second level of the conceptual framework represented the tools used by the physiotherapist such as communication techniques, manual techniques and modalities. At the third level was the dynamic therapeutic intervention also termed the ‘black box’ (Jensen et al 1990 p315) through which the factors of level one and two are filtered. It was to further study this little understood ‘black box’ of therapeutic intervention that the observational instrument and conceptual framework described below were developed.

Physiotherapist-patient interactions during treatment were both observed and audiotaped. Integrated transcriptions of both the verbatim data from the audiotapes and the non-verbal and environmental data from the observer’s field notes were coded. The data yielded coding categories for physiotherapist and patient statements. From these they were able to develop an observational instrument that could be used to systematically observe therapist-patient interactions. Five themes representing a small part of the initial conceptual framework also emerged from analysis of the data. These themes were seen as tentative and as representing possible dimensions of the overall treatment encounter that may differentiate experienced clinicians from novices. Two themes (allocation of treatment time and impact of the therapeutic environment) had to do with organisational factors mentioned in the first level of the framework. The other three (types and uses of information gathered from the patient, degree of responsive therapeutic interaction and therapist integration of social and/or miscellaneous interaction with therapeutic interaction) related to client-therapist interactions that occur during treatment.

2.17 Jensen et al (1992) - Attribute dimensions of master clinicians

Further work was carried out Jensen et al (1992) using the ‘tools’ developed by the 1990 study. The work of three master clinicians and three novice clinicians practising in orthopaedic outpatient physiotherapy settings in three different regions of the United States was observed. This was a qualitative case-study approach (also utilising a grounded theory methodology) with the intention of elaborating and revising theory concerning the existing

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13 A related piece of qualitative research was carried out by Embrey et al (1996a). They studied the work of experienced and inexperienced paediatric physical therapists for children with diplegic cerebral palsy. Their findings, which differentiate between the two groups of therapists, largely concur with the existing literature in so much that there was identified a greater attention to the psychosocial factors regarding the patient among the experienced group, while those same therapists also exhibited self monitoring behaviour. They also posited ‘movement scripts’ as encapsulated knowledge or clinical patterns which the therapists recognised and made use of in treatment. As discussed in Chapter 4, this study was, however, grounded more in a cognitive science approach than an interpretive one.
conceptual framework of the work of physiotherapists. The focus of observations in this study, as in the previous one, was on the complex and little understood processes that occurred during the treatment encounter.

Data was collected and analysed using the previously developed observational instrument and conceptual framework. Analysis of the data within and across cases revealed five attribute dimensions that distinguished the master clinicians from their novice colleagues and represented a revision of the initial five themes. These were: confidence in predicting patient outcomes, ability to control the environment, evaluation and use of patient illness and disease data, focus of verbal and nonverbal communication with patients and importance of teaching to hands-on care. These attribute dimensions related to both knowledge and improvisation performance in the clinical situation and appeared to distinguish between the therapeutic interventions of the master and the novice clinicians.

This study focussed on the clinical qualities or attributes of the clinician with expertise rather than their reasoning strategies or knowledge frameworks. It did, however, uncover that the expert or master clinicians (as they termed them) attended to phenomenological factors rather more than their novice counterparts. The centrality of teaching to clinical practice of experts also focussed new attention on how this is likely to be a function of clinical reasoning expertise rather than mere inclination.

It will be shown how the development of conceptual frameworks in this study (with its emphasis on clinical reasoning) diverges but, nevertheless, supports much in the conceptual frameworks developed by Jensen et al between 1992 and 1999. The later findings of Jensen et al (1999) are referred to in the findings chapters.

2.18 Summary: clinical reasoning moves from cognition to include an interactive process
This chapter has demonstrated how clinical reasoning, as a discipline, had its genesis in medical education. The teaching of and research into clinical reasoning was carried out through predominantly cognitive science models. In these models clinical reasoning was expressed as a cognitive process characterised by hypothetico-deduction and pattern recognition (as a form of knowledge organisation).

Using other research methods, researchers in allied health have described clinical reasoning as a process, or set of strategies, which permeate various realities or tasks of
clinical practice and not just the activity of ‘diagnosis’. These strategies (in the main) purport to adopt alternative ways of understanding patients and acting with them in their situations than have been offered in the cognitive models of reasoning inherited from medicine. What can be said with some certainty here is that clinical reasoning in allied health has moved from a process emphasising cognition to one which is also concerned with interaction.¹⁴ The role of different reasoning processes in clinical practice is less clear at this point and is a major theme in the findings chapters.

Most of the work into clinical reasoning in the health professions has been done around the expert - novice dichotomy (Benner et al 1996, Jensen et al 1992, 1999). That is, there has been a focus on the expertise of practitioners and how they learn and make decisions. Given that reasoning has been identified above as an interactive process, there is a need to explore a framework in physiotherapy whereby the learning (thinking, beliefs and values) of the patient is considered. This forms the basis of the next chapter.

¹⁴ It must be acknowledged that within medicine there are protagonists who emphasise other ways of understanding patients (e.g. Greenhalgh and Hurwitz 1998, Hudson Jones 1997, Hunter 1991).
Clinical reasoning and adult learning

3.1 Introduction
In this chapter I review recent developments in adult learning theory as espoused in interdisciplinary literature from psychology, education and sociology (in particular critical theory) in order to examine the relationship between adult learning and clinical reasoning. The chapter outlines consensually emerging findings emphasising the importance of meaning, problem conception and context as antecedents of adult learning. In a similar manner to the shift which was identified in the last chapter concerning the understanding of clinical reasoning, so too, there is an observable transition in adult learning theories from cognitively and behaviourally oriented models to more constructivist ones.\footnote{Constructivism will be discussed further in the methodology chapter. Briefly, it assumes the existence of multiple realities which are together constructed by knower and subject.}

Adult learning has been described, in the context of allied health education, as “the ideal choice of educational philosophy and framework for clinical reasoning (teaching) programs” (Higgs et al 1999 p199). In broad terms the initial interest of this study in adult learning is distinct from its relevance for formal training courses. The interest here derives from the fact that physiotherapists in clinical practice are both learners - that is, acquirers and interpreters of clinical and other knowledge (Higgs and Jones 1995) - and teachers - practitioners of so called patient education (Levitt and Goldschmied 1990, Carpenter 1996). The corollary of this is that physiotherapists’ patients or clients and/or their carers\footnote{From this point on the term patient will be used and the possible involvement of carers assumed unless specifically stated. The terms ‘patient’ and ‘client’ were used by different therapists in the study. Patient, client and customer all have particular connotations commending their use. However, since ‘patient’ implies a duty of care on the part of the therapist not found in the terms ‘customer’ or ‘client’ (Ritchie 1998), it will be employed here. Also, the terms ‘physio’, physiotherapist and physical therapist are synonymous, the latter being the North American designation.} are potential learners (and, as will be shown in the case studies, potential teachers as well). Accepting for the moment that the attributions of learner/teacher to both therapists and
patients have some substance, current theories as to how adults best learn and the antecedents for such learning are pertinent to any consideration of clinical reasoning.

The question of how adults learn from experience has long preoccupied protagonists in the field of adult education (Dewey 1938, Knowles 1980, Merriam 1994) and must also be asked in this context: How do therapists learn from their clinical experiences? How do they learn from their lives and personal experiences? How are these integrated into their professional practice, if at all? Similar questions may be asked concerning patients: How have previous experiences of ill health and resultant clinical experiences of medical and/or physiotherapy care shaped their expectations and beliefs (knowledge) toward therapy? What personal and other life experiences do they bring to the encounter? What do patients actually learn in the clinical encounter?

Let us provisionally define the physiotherapy treatment encounter, in adult learning terms, as one in which therapist and patient each bring a particular type of experience to the encounter, each expect (or perhaps don’t expect) to learn something new from that experience and also from the (inter)action which ensues and, finally, each seek some kind of desired and beneficial change from that (inter)action and learning. Thus, there are two different sets of experience, knowledge and learning which must achieve some kind of coherence and transference in a therapeutic encounter. This is a comparable process in various settings of adult education between teachers and learners (Lee 1994b, Maciuika et al 1994).

3.2 The development of adult learning theory

Adult learning has endeavoured to form its own identity or paradigm of practice as distinct from other fields of education such as childhood learning (Welton 1993). Attempts over the last two decades or so to codify or embody the principles distinguishing adult learning from that of childhood learning have been accompanied by changing research paradigms and the contributions of other disciplines outside traditional educational and behavioural psychology and the literature of adult education itself (Merriam 1993).

The early study of adult learning was dominated by behaviourism and empiricism where there was an underlying assumption that the world existed independently of the learner or knower (Maciuika et al 1994, Pratt 1993, Wilson 1993). In this view “learning is an individual and internal mental process in which knowledge is acquired and stored for use
at will in any circumstance” (Wilson 1993 p72). Parallels between this and the early eras of clinical reasoning study are evident and not surprising given the dominance of cognitive science in both fields.

In the last decade educational, developmental and, more recently, cognitive psychology have undergone shifts in emphasis such that consideration of the learner’s experience, personal history, and social and cultural contexts now occupy a more significant place in research (Greeno 1998, Merriam 1993, Sternberg 1998).

One overview of the development of adult learning theory comes from Merriam (1993). She cites three major thrusts of adult learning theory over the last twenty-five years: andragogy (Knowles 1980), self directed learning (Houle 1961, Knowles 1975, Tough 1971 all cited in Knowles et al 1998) and transformative learning (Mezirow 1990). These three waves of adult learning theory reflect the changing emphases in the consideration of the learner and their context and the contributions of other disciplines to adult learning. Of the three, the main attention in this chapter will be directed towards Mezirow’s work since it forms a meeting place for several paradigms at once: adult education with critical social theory; human agency with social structures; and instrumental (hypothetico-deductive) reasoning with communicative (meaning based) reasoning. The appeal of Mezirow’s transformative learning theory lies in its explanation of how experience, learning and meaning are related (Merriam 1994).

The first wave of adult learning theory, the theory of andragogy, represented a movement away from the behaviouristic perspective on the nature of learning by emphasising that while the world may exist it is the individual’s experience of that world which is important to learning (Pratt 1993). Andragogy continues to rest on two implicit principles: namely, that knowledge is actively constructed by the learner not passively received from the environment and, secondly, that learning is an interactive process with “one’s experiential world” (Pratt 1993 p17).

The second major construct of adult learning theory, self directed learning, is based on the fact that adults are independent and thus self directing (Caffarella 1993, Knowles et al 1998). The importance of involving learners in the process of setting their own means of learning and evaluation is seen as a method of facilitating their personal autonomy and self direction (Pratt 1993 p19). However, whilst providing a fresh understanding of the
experiential and interpretive nature of adult learning, one criticism of both andragogy and self-directed learning has been their emphasis on the individual nature of the learner with an assumed autonomy and capacity to be self-directed quite apart from the social structures which may impact on them (Pratt 1993).

3.3 Perspective transformation as an antecedent of adult learning: Mezirow’s transformation theory

Mezirow’s theory of transformative learning or perspective transformation which Merriam regards as the third significant wave of adult learning theory, draws heavily on the critical social theory of Habermas (Mezirow 1990). It is also grounded in his own research (Mezirow 1975 cited in Mezirow 1991). Mezirow and his colleagues conducted a national study of women returning to college after a hiatus to participate in specialized re-entry programs. Structured interviews were conducted with eighty-three women in twelve programs in different cities and with the professionals operating these programs. The concept of perspective transformation was delineated inductively from the fieldwork. Ten phases of perspective transformation were identified:

1. A disorienting dilemma
2. Self examination with feelings of guilt or shame
3. A critical assessment of one’s epistemic, sociocultural, or psychic assumptions
4. Recognition that one’s discontent and the process of transformation are shared and that others have negotiated a similar change
5. Exploration of options for new roles, relationships, and actions
6. Planning of a course of action
7. Acquisition of knowledge and skills for implementing one’s plans
8. Provisional trying of new roles
9. Building of confidence and self-confidence in new roles and relationships; and
10. A reintegration into one’s life on the basis of conditions dictated by one’s new perspective.

Similar phases of perspective transformation have been subsequently confirmed by other research (cited in Mezirow 1991).

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17 Social structures are defined as institutions and systems in society that determine discourses on the communication of meaning, the exercise of power and the legitimation and judgement of conduct (Pratt 1993). Discourses, in turn, may be defined as “dynamic dialogues in which meaning is socially and historically produced, reproduced and transformed in interaction” (Grbich 1999 p153). Particular discourses wield power as Pratt suggests above and these concerns are found (although not exclusively so) in the critical theory of Habermas (1972, 1979 and 1984) to be briefly expounded in this chapter.

18 Morgan (1987) studied thirty displaced homemakers who had been either separated, divorced or suffered the death of a spouse and were involved in a college program. Similar stages of perspective transformation to those participants in Mezirow’s study (1975) were identified. Williams (1986) studied the perspective
Mezirow argues for the centrality of structuring meaning from experience in understanding how adults do (or don’t) learn. Learning is described as “the process of making a new or revised interpretation of the meaning of an experience, which guides subsequent understanding, appreciation, and action” (Mezirow 1990 p1). Mezirow further proposes that all human beings function within meaning schemes which are complex sets of habits and expectations governed by beliefs, theories and psychocultural assumptions. These meaning schemes, termed meaning perspectives, are the filters through which personal experience is mediated and further interpreted. While such schemes or perspectives organise experience and make it coherent through providing ‘principles of interpretation’ (p3), they may also distort perception to some degree by establishing ‘habits of expectation’ (p4). Such habits of expectation may limit perception. Transformative learning is about fostering critical reflection such that distortions in meaning perspectives may be identified and corrected. These distortions may be epistemic (the way in which knowledge or problems are conceived), sociolingual (discussed below p44) or psychological (artifacts of previous personal experience) (Mezirow 1991).

Critical reflection refers to “challenging the validity of presuppositions in prior learning” (Mezirow 1990 p12). In other words, the underlying assumptions of the meaning perspective are identified, critically assessed, and reformulated “to permit the development of a more inclusive, discriminating, permeable and integrative perspective” (p 14). It is relevant to note the similarity between Mezirow’s notion of a distorted meaning perspective and White and Epston’s (1990) notion of a dominant narrative. Both have their foundation in the interpretation of experience guiding action and both derive from a constructivist perspective of knowledge despite the distance between the disciplines (Clark 1993, White and Epston 1990).

transformation of twenty eight men who were engaged in a twelve week course to change abusive behaviour toward their spouses. Perspective transformation ratings were developed with a high correlation between raters. An outcome of the study was that changes in meaning perspective related significantly to changes in behaviour. Hunter (1980) studied perspective transformation as a result of ill health and found a pattern of change following seven phases. A common factor was the necessity of change to cope with unresolved difficulties. Merriam and Clark (1991- cited in Merriam 1994) obtained open ended responses from 405 adults concerning significant learning experiences. Nineteen interviews allowed them to probe further about learning experiences. They found that learning experiences considered significant were those that both personally affected the learner and were subjectively valued by the learner. The experience resulted in a transformation in skills, sense of self or life perspective which were similar to Mezirow’s concept of perspective transformation.
An important tenet of Mezirow’s ideas, and one which is of particular interest in this thesis, is his distinction between instrumental and communicative learning or reasoning (the two terms may be used interchangeably here). Instrumental problem solving involves reflection on procedure and performance in a cause and effect manner otherwise known as the hypothetico-deductive approach (Mezirow 1990 p9). According to Mezirow, however, not all learning involves learning to do. He suggests: “Of even greater significance to most adult learning is understanding the meaning (his emphasis) of what others communicate concerning values, ideals, feelings, moral decisions, and such concepts as freedom, justice, love, labor, autonomy, commitment, and democracy” (p8). 19

Mezirow describes communicative learning as a focus on achieving coherence in understanding. Understanding meaning through communicative reasoning also requires a process of validation but this is less a matter of testing hypotheses so much as through rational discourse or consensus (p9-10). Here Mezirow refers to Habermas’ conditions for ideal communication (Habermas 1984). Habermas argues for four validity criteria in communicative interaction. The first is comprehensibility. If speech is ambiguous, confused, nonsensical or so cluttered with jargon as to exclude others from understanding then learning cannot take place. Secondly, sincerity and motive must be transparent and the speaker trustworthy. Thirdly, the question of appropriateness or legitimacy is concerned with determining proper roles and contexts. Critical reflection enables the learner to question their acceptance of assertions and the process by which assertions have been made. The fourth criterion, truth, is determined by checking the evidence: is information being withheld, responsibility obscured, or need misrepresented? (Welton 1993 p86).

3.3.1 A short critique of Mezirow and Habermas

Although Mezirow’s work is credited with the channelling of Habermas’ ideas into the field of adult education, the insights of Habermas have provided adult educators in general

19 Whilst at first reading such a list of grand scale human concerns may seem far removed from the physiotherapy clinic or treatment encounter, a second glance reveals the relevance of many of the entities mentioned. Values, ideals, feelings, moral decisions are all found and wrestled with in the physiotherapy treatment encounter at different times. If it is not apparent at this time to the reader it is hoped to be beyond doubt by the end of the thesis. Even justice, autonomy and commitment are entities which may require expression in the realm of physiotherapy practice (see Sim 1998 re: autonomy, see Davis 1998, French 1997,
with “a powerful means of understanding the unity in the diversity of human learning processes and outcomes” (Welton 1993 p82). Habermas’ exposition of the different types of knowledge and theory of communicative action have provided a link, therefore, between whether human agency (with the individual at the interpretive centre of learning and cognition) or social structure (with discourses shaping meaning perspectives), provide the main antecedents in adult learning. Critical theory has enabled adult learning to be now viewed in terms of “a reciprocal relationship between the individual and social structures - each giving meaning and shape to the other” (Pratt 1993 p18).

One criticism of Mezirow has been that he has appropriated critical theory which is aimed at social change to an individualist framework. That is, he uses Habermas’ social theory to focus on an internal process of individuals (Clark 1993). While there may be some truth in this, nevertheless, Mezirow points out that distortions in premise or meaning perspectives may be sociolinguistic:

Factors creating sociolinguistic premise distortions include all the mechanisms by which society and language shape and limit our perception and understanding, such as implicit ideologies; language games; cultural codes; social norms, roles, and practices........ For the most part we take for granted and are unaware of these social norms and cultural codes, which distribute power and privilege. Our meaning perspectives mirror the way our culture and those responsible for our socialization happen to have defined various situations (Mezirow 1991 p130-131).

Transformative learning is seen as a staging post to emancipatory education which is “an organised effort to help the learner challenge presuppositions, explore alternative perspectives, transform old ways of understanding, and act on new perspectives” (1990 p18). Such changes in consciousness linked with action are the same principles which were advocated by Freire (1972) where critical reflection (‘reflective engagement’) and changes in consciousness (‘conscientization’) enabled whole communities (especially those impoverished and illiterate ones) to act for social and political change in their situations


20 Habermas conceives of knowledge as technical, practical and emancipatory (Habermas 1972). Technical knowledge derives from our interaction with nature to produce existence and is interested in prediction and control. Practical knowledge derives from the communication of persons with one another. This exchange creates a practical interest in the understanding of meaning. Emancipatory knowledge derives from our desire to achieve emancipation from domination of individuals or groups over one another. The forms of knowledge guided by the technical and practical interests are always open to questioning and re-examination (Welton 1993). But reason also demands explicitly nondistorted communication (Habermas 1984). For Habermas, a critical social science cannot rest satisfied with discovering regularities in social action. It must also ask whether our beliefs, values and interactions express dominative relations that can, in principle, be changed (Welton 1993 p83). This expresses a humanism which sits well with the humanism of Paulo Freire and his pedagogy aimed at socio-political action (Freire 1972).
Freire (1997). This occurred across South and Central America and then in other parts of the developing world through literacy programs and later in community based health programs (Werner and Sanders 1997).

Habermas’ theory of the conditions for ideal communication (which form the basis for Mezirow’s ‘testing’ or consensual validation of the integrity of communicative learning or reasoning) has been criticised for being too naive (Grbich 1999). For example, do conditions for ideal communication ever really exist? And, isn’t Habermas’ theory of a new social order based on a rather shaky premise in its so called conditions for ideal communication? (Silverman 1985, 1997).

Freire, himself, never considered rational discourse naive, holding to the centrality of rational communication in the transformational learning process (Freire 1972, 1997). For Freire, “[d]iscourse is reflection made public” (Clark 1993 p54). Mezirow maintains that even in situations where ideal conditions do not exist for rational discourse, Habermas’ theory of communicative action provides “a standard against which to assess educational and social practice” (Mezirow 1989 p171).

At this point it can be seen how far this conception of learning has moved from one which is mainly concerned with changes in the behaviour or cognition of the learner. Behavioural change is inadequate as an explanation to understand the changes in consciousness brought about by transformative learning. Multiple psychosocial factors must be considered (Clark 1993). Learning, therefore, is not restricted to the personal domain but it is inextricably related to larger social, political and environmental contexts (Sinnott 1994, Kramer and Bacelar 1994) as well as moral action (Lee 1994). Critical reflection, whether it is private and to do with the personal presuppositions brought to learning, or public and to do with the wider discourses which shape many of those same presuppositions, leads to a new consciousness and to personal or collective change (Heaney and Horton 1990).

Furthermore, such a conception of adult learning emphasises the collaborative and participatory dimensions to learning in addition to individualistic and didactic ones (Greeno 1998, Lee 1994).

3.3.2 Transformation theory and physiotherapy
What has all this to do with clinical reasoning in physiotherapy? Physiotherapists not only ‘do’ to or for their patients they also interact in considered, constructive and responsible
ways with them (Beeston and Simons 1996, Jensen et al 1992, 1999). Higgs and Hunt, in reviewing the various models of health practitioner, have posited ‘the interactional practitioner’ as the future model of health practitioner. In this model established notions of competence, reflection, problem solving and professionalism need to be joined by “three other practice concepts: social responsibility, interaction and situational leadership” (Higgs and Hunt 1999 p15).

The three concepts mentioned above under the umbrella term, ‘the interactional practitioner’, imply a form of required learning and knowledge in line with an understanding of adult learning which reminds us that both therapist and patient bring to the therapy encounter personal presuppositions which are shaped by numerous meaning perspectives and discourses.21 As a consequence, it cannot always be assumed that communication is occurring between therapist and patient in either an intelligible or an effective manner. For example, in the area of patient education - Is teaching being understood by the patient? Is it being acted on by the patient? Has it been effective? What are the assumptions behind therapists’ selection of what is taught, what is advised and/or what is counselled? Even assuming the content of such teaching is evidence based, how then is teaching contextualised to the particular needs and situation of the patient? Other questions might be asked in the area of inquiry - Has the patient been understood? What is the patient’s view of his or her condition and the prospects of return to normal function and participation at home, work and recreationally? Or, in the area of collaboration, what are the goals of the patient? Have they been assumed or have they been made explicit? How do they fit with the goals of the therapist? Similarly, there may be ethical questions related to patient autonomy versus an ‘ideal’ treatment envisaged by the therapist. Perhaps there is a conflict between a patient’s wishes and those of the family.

Such questions derive from the multiplicity of issues potentially arising both within and without the treatment encounter and from the presuppositions (meaning perspectives) brought to the encounter. Fundamentally, it is a matter of what is considered most

21 An example of a particular physiotherapy discourse on disability and its effect on disabled people is well articulated by Johnson (1993) in her study “Attitudes just don’t hang in the air.....” : Disabled people’s perception of physiotherapists. Physiotherapy Vol 79: 619-627. Johnson argues that physiotherapists’ adoption (consciously or unconsciously) of a medical model (discourse) in the diagnosis and management of disability, conceived of in terms of a measurement of deviations from the normal, has often been both unhelpful and discriminatory for disabled people as they struggle against disabling attitudes and assert their rights to participate in mainstream society.
important by each of the parties involved. This requires explicit investigation whether it be straightforward and brief or complicated and ongoing.

The nature and conditions of the interaction between therapist and patient should, therefore, in many instances (examples of which will be given in the case studies), be subjected to the same critical reflection and scrutiny (or validation) as the physical testing and procedural aspects of the treatment session. The ideal vehicle for such reflection and scrutiny (as suggested at the head of the chapter) is clinical reasoning. Notions in existing clinical reasoning theory such as determining errors in logic (Jones et al 1995) could be accompanied, therefore, by identifying distortions in epistemological, sociolinguistic or psychological meaning perspectives in either therapist and/or patient.22

Monitoring interactive and communicative processes between therapist and patient within a clinical reasoning framework implies a responsibility on the part of the therapists to understand the processes by which adults learn. This responsibility would include the necessity of therapists engaging, as adult learners themselves, in critical reflection on their own assumptions. They would reflect critically not just on the diagnostic, management and interactive ‘events’ which arise in a clinical encounter but also on the professional and personal values which are brought to the encounter and the ways in which these have been shaped. Using these clinical reasoning skills, therapists in the role of teachers, and as part of an interactive reasoning process, would seek to foster similar critical reflection in and by the patient.

Mezirow’s concept of adult learning, including its differentiation of instrumental and communicative reasoning, provides a potential framework for both achieving communicative coherence in therapist-patient interaction and for guiding critical reflection. In doing so, the process of learning for each party within the relationship might be identified (whether that be the development of professional or personal knowledge). There is also the promise of a reasoning construct, through the contribution of Habermas’ critical social theory, which is able to apprehend and scrutinise the various issues both within a particular treatment encounter and in the ‘outside’ factors or discourses affecting the context and delivery of treatment. And there is little doubt that a reasoning framework able to move in such territory is crucial:
Without an accurate reading of the causes of a problem (are these embedded in our own actions, in our patients’ past histories, in the wider political or professional constraints placed on our clinical practice, or in a particular intersection of all these?) we are crippled in our attempts to work through it (Brookfield 2000 p65).

3.3.3 Critical reflection: hard work and opportunity

It must be noted, however, that critical reflection and the exploration of one’s prior assumptions is not necessarily an easy, detached or painless process (Brookfield 1990). This is the case in transformative learning both for individuals, where certain life events or crises have provided painful opportunities for perspective change (Mezirow 1991, Morgan 1987), and for groups or communities whose increasing awareness of the effects of systematic injustice on poverty and health have galvanised them into an often sacrificial struggle for change (Werner 1988, Werner and Sanders 1997, Werner 1998).

In the clinical context of physiotherapy practice, Martin et al (1995), in their qualitative multiple case study of 21 expert physiotherapists in Sweden, found that crises in personal and professional life “brought them to a deeper understanding of themselves and contributed to both their personal growth as well as their professional growth” (p239). Such crises were part of a larger categorisation of considered influences in professional development which also included the influence of mentors/role models, colleagues and patients. Whilst not accounting for the processes by which learning occurred from such crises, the strong conclusion of the study was that critical reflection, often provoked by uncomfortable or painful experiences in either professional or personal domains, had the potential to play a significant role in the development of the therapists’ practice expertise.

Critical incidents (past or present) in the lives of patients, too, may trigger painful questioning and the critical reflection of assumptions or meaning perspectives as a precursor to learning (Brookfield 1990, Merriam 1994). The proposition that dominant narratives are, with their deleterious effects on the lives of clients presenting for family therapy (White and Epston 1990), expressions of distorted meaning perspectives (Mezirow 1991) will be explored later in the thesis. Suffice it to say here that physiotherapists often encounter patients at critical times in patients’ lives. Three examples, one from each composite case study, to be discussed in later chapters, are the dying patient in palliative care, the person on the roller coaster of chronic pain, and the patient with recalcitrant or progressive neurological disease. Of course, in each example

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22 These errors in logic in clinical reasoning are listed in Chapter 6 p130.
the effects, emotionally and otherwise, on patients and their families or carers are profound which, in turn, may directly or indirectly impact on the therapist. Wider discourses influencing these situations are also evident in the form of professional or societal attitudes towards the patient and/or their problem(s). The implementation of particular health policies also impact on therapists’ abilities to provide the care they consider appropriate since they also determine the resources available to patients.

To cope with and address this myriad of factors, therapists must be able to critically reflect in diverse domains; from the physical to the emotional, and from the individual to the social (or even political). Although situations of dilemma and/or crisis do not generally characterise or constitute the whole of clinical practice in physiotherapy, nevertheless, when they do arise therapists’ reflection is stimulated creating the possibility of learning for both themselves and their patients. That this reflection is critical (i.e. involving the questioning of one’s own assumptions) and leads to transformation of meaning perspectives is suggested by Martin et al (1995), at least in relation to the therapists themselves, and will be further examined in the findings chapters.

3.4 Problem conception as an antecedent of adult learning: post formal thinking

So far the discussion has been centred on how adults make meaning of their experience(s) and how learning can result through revised assumptions and subsequent action(s). The focus will now move to how adults as learners conceptualise problems. This examination will draw predominantly on theory and research from the literature of adult lifespan learning and adult education.

Adult lifespan learning as a discipline holds that adults continue to develop cognitively throughout life (Sinnott 1994b). This stands in contrast to the views of those researchers in adult learning from a cognitive experimental tradition, who “as a rule, are looking for processes underlying all human thought, not for processes unique to a developmental stage or sequence or group (Sinnott 1994b p 106). Adult lifespan learning is based on a re-interpretation and extension of the work of Piaget (so called neo-Piagetian theory) which is organised around a constructivist position (Sinnott 1994b). Two of several explanations

of adult reasoning arising from this position are dialectical thinking, (Kramer and Bacelar 1994, Maciuika, Basseches and Lipson 1994), and postformal thought (Sinnott 1994a and b).

Underlying dialectical thinking is the notion that adults develop through challenges that upset existing equilibria of thought (Basseches 1984 cited in Maciuika, Basseches and Lipson 1994). Such challenges often present as ill-structured problems which have multiple causes and thus require multiple solutions and where multiple perspectives and conflicting notions about what is true are to be taken into account (Lee 1994a). Dialectical thinking, therefore, can be defined “as a cognitive system capable of tolerating complex, multidimensional problems characterised by contradiction, uncertainty and change” (Kramer and Bacelar 1994).

Dialectical thinking is regarded as one expression of postformal thought (Basseches 1984 cited in Maciuika, Basseches and Lipson 1994, Sinnott 1994b). The two entities share “the realisation that knowledge and truth are not absolute but must be chosen from possible truths by the knower” (Sinnott 1994b p107). It is not difficult to see the constructivist influence in this approach to adult learning.

In order to understand the notion of postformal thinking it is necessary to first understand what is meant by Piaget’s (1972) formal thought operations. Children’s thought processes develop in the following sequence: first, they move from innate reflex actions where one learns to coordinate the body (Piaget’s sensorimotor, preoperational level), to being able to represent concrete objects in symbols and words (preoperational stage), to an understanding of concepts and relationships of ideas (concrete operational stage), to an ability to reason hypothetically, logically, and systematically (formal operational stage) (Merriam and Cafarella 1991). The inference from this cognitive developmental sequence is that learners, as they mature, move from points of certainty, where facts and reality are clear cut, to points of uncertainty and questioning before once again reaching a point of understanding reality in a new way (Sinnott 1994b). This process is tantamount to a change in consciousness which is regarded, itself, as a field of inquiry in adult learning (Boucouvalas 1993, Merriam 1993).

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Postformal thought represents the patterns or structures of thinking for adults which are seen as developmentally beyond or different from Piaget’s stage of formal operations. This is expressed as “cross paradigmatic operations” or the capacity to relate perspectives that appear to be independent of one another (Commons et al 1984 cited in Mezirow 1991 p155). It is contended that both postformal thinking (like dialectical thinking) develops with social experience and usually not before mature adulthood (Sinnott 1994a). Transformation theory essentially agrees with the differentiation between formal and post formal thought and its assertion as a function of mature adult thinking:

Learning to treat propositions hypothetically is what formal operation thought means........ Transformation theory holds that being able to transfer hypothetical thinking to the propositions upon which our norms are predicated is a distinctively adult process (Mezirow 1991 p 150).

There is further corroboration of post formalism’s developmentally based analysis of adult reasoning from the literature of adult education (outside of adult lifespan learning). Kitchener and King (1990) found that students at different ages and educational levels entering the learning environment have markedly different assumptions about what and how something can be known and how to make judgements in light of these assumptions. In their Reflective Judgement model (1990), they posit several stages of problem conceptualisation. The earlier stages are characterised by a belief (meaning perspective) that one can know absolutely through concrete observation or that the learning task is one of “discovering the truth or identifying someone, an authority, who can explicate it” (p174). The latter stages of problem conceptualisation culminate in an understanding that there are “many problems for which there are no absolutely true answers” and the learning task is “to construct a solution that is justifiable after considering alternative evidence and interpretations” (p174).25

Kitchener and King, like the postformalists, contend that the latter conception of reasoning does not develop until the adult years (late twenties or early thirties). Further to this, they

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25 Other principles of post formal thought include the idea that given problems can be addressed in either postformal or formal ways. The notion that the same person can, in different situations, use either formal or post formal operations will be alluded to at other times in the thesis. The underlying distinguishing characteristics between formal and postformal thought is that the former adopts positivist assumptions in problem solving while the latter works from a constructivist position (Lee 1994a). This conclusion is reinforced by an examination of the two reasoning processes (formal and postformal) as applied in interpersonal relations (Sinnott 1994b p112) and is not dissimilar to White’s (White and Epston 1990) analysis of psychological interventions contrasting formal systems and narrative analysis.
found that the development of problem conceptualisation, as an ability, is also usually “tied to advanced education when individuals are involved in the creation of knowledge” (1990 p174). Importantly, they also conclude that such educational experiences may be inside or outside the classroom. Arguably, the physiotherapy clinic may be one such forum.

There is some consensus, then, that mature adult reasoning involves an ability to apprehend the multi-dimensional nature of problems. Postformal thinkers, therefore, in dealing with an ill-structured problem are aware of their own perspectives and the limits of their own knowing, while being simultaneously aware of the perspectives of others involved (Lee 1994a). Thus, what is termed self-referential knowledge as well as the knowledge of others is brought to bear in the situation (Lee 1994a). Self-referential knowledge, defined as the ability to be aware of one’s own meaning perspective, has the ring of metacognition to it. That is, the ability to monitor one’s own thinking (Jones et al 1995) which, in turn, appears much like the activity of critical reflection described by Mezirow (1990). Similarly, the apprehension of ill structured problems has been described elsewhere, through different theoretical and research ‘eyes’, both as a characteristic of expertise (Chi, Glaser and Farr 1988, Higgs and Jones 1995, Sternberg and Horvath 1995) and as a fact of life in professional practice (Schön 1983, 1987). The important consideration here, though, is that these abilities are described as a feature of the cognitive development and potential learning abilities of the adult learner in general and not just the ‘expert’ or the professional practitioner. It is suggested that the adult learner’s ability to apprehend the multidimensional (or ill structured) nature of many problems can also be developed, leading to a more complex understanding of reality (Kitchener and King 1990, Sinnott 1994b).

The implication of these principles of learning - firstly, the ability to question and then evaluate previously held assumptions, and secondly, the ability to conceptualise problems from multiple perspectives - lies in therapists fostering not only their own critical reflection but that of their patients in the consideration of personal or wider issues influencing their symptoms and/or their situations.

A logical development of the awareness of others’ perspectives in apprehending ill structured problems is that learning processes (the creation of knowledge), although located with (and within) the individual, also become inherently social (Sinnott 1994b).
This emphasis on the construction of socially embedded practice knowledge is regarded in the literature of allied health, also, as a feature of a mature clinical reasoning process (Benner et al 1996, Jensen et al 1999, Mattingly and Hayes Fleming 1994).

3.5 Interaction with context as an antecedent of adult learning: situated cognition

The third theoretical and research perspective of learning to be discussed is known as ‘situated cognition’ (Greeno 1989, 1998, Lave 1988, Wenger 1998). As in postformalism there is a recognition of the intrinsic role of social interaction and context in learning or ‘structuring cognition’ (Wilson 1993 p76). Proponents of situated cognition or ‘the situated perspective’ hold to a theoretical focus on interactive systems that are larger than the behaviour and cognitive processes of an individual agent (Greeno 1998). This position assesses that:

...20th century psychologists have focused theoretical attention on the behaviour and cognitive processes of individual people and animals and have treated the rest of the social, material, and informational environments as contexts in which individual behaviour occurs (Greeno 1998 p 6)

Cognitive science by focussing on individual internal processes has therefore done so at the expense of making known the actual nature of experience and activity and their effect on cognition:

Cognitive science analyses structures of the informational contents of activity, but has little to say about the mutual interactions that people have with each other and with the material and technological resources of their environments (Greeno et al 1998 p6).

Exemplifying this point, Lave (1988) demonstrated that even in a subject apparently as decontextualised as arithmetic, learning is structured by social and contextual factors. Lave examined adults’ computations of comparison pricing in the actual shopping for groceries where shoppers used elements in the setting. The shoppers used the materials in the setting (e.g. physical layouts, the proximity of similar products, packet shape etc.) to achieve an impressive 98% error free set of solutions. When tested, shoppers appeared to use a reasoning which employed regularities of numerical patterns rather than standard numerical calculations. When tested in the same computational concepts using pencil and paper, and using school taught arithmetic, the adults’ error free rate dropped to 59%. Lave asserts that the context for learning actually provides many of the tools for this learning (Lave 1988). Rose (1999), in studying both the development of tactile diagnostic skill and the methods for teaching an Australian model manipulative physiotherapy program in Los Angeles, concluded:
The concepts, techniques, uses of language and other signs, and habits of mind we have seen have complex histories of development, and these technical, discursive, and cognitive practices can be understood as the ‘tools of the trade’, transmitted by the professional culture, that constitute the practice of the Australian approach to manual physical therapy (Rose 1999 p150).

Rose is saying that the methods of teaching and conceptions of knowledge are highly contextualised culminating in a virtual enculturation of the student into a particular practising community. The concept of learning and knowing as a process of enculturation is a further development of the social embeddedness of knowledge (to use Benner’s term). The implications of these tenets of situated cognition will become apparent as we explore the development of particular conceptions of knowledge and sense of culture within the three different fields of physiotherapy (Chapters 10 and 11). It provides a framework for considering how conceptions of skills (including reasoning strategies) such as handling, collaboration, interaction or prediction vary within or across the fields. Conversely, the potential differences between understandings of concepts and, for that matter, meaning perspectives between therapist and patient might be understood further in terms of the different contexts in which those understandings were shaped.

The situated perspective positions itself as an attempt at synthesis between cognitive science and behaviourist understandings of knowledge leading to more interactive and constructivist practices (Greeno et al 1998). In the context of this discussion on learning the difference in perspectives is stated:

Behaviourist principles tend to characterise learning in terms of acquisition of skill. Cognitive principles tend to characterise learning in terms of growth of conceptual understanding and general strategies of thinking and understanding. Situative principles tend to characterise learning in terms of more effective participation in practices of inquiry and discourse that include constructing meanings of concepts and uses of skills (Greeno et al 1998 p14).

Situated cognition emphasises the fact that the conception of problems actually develops by action and interaction within context and, because of this, is likely to present as changing and dynamic ‘problem spaces’ or, to use the term adopted previously, as ill structured problems (Greeno et al 1998 pp7-8). In this they find allies in the postformalists and other adult educators including Donald Schön whose ideas on the ambiguity of the actual problems faced in day to day professional practice have already featured in this thesis. Together they argue that, hitherto, the strategies of cognitive science for apprehending ill structured problems or changing ‘problem spaces’ have been inadequate and that both problem conception and problem solving must occur in a dialogical manner.

3.6 Summary: a constructivist view of learning
In this chapter I have considered learning and reasoning from the point of view of adult learning in order to include both physiotherapist and patient and their interaction in the clinical reasoning process. Antecedents of learning which are regarded from a diverse range of thought as being significant in their potential for understanding and enhancing learning and the generation of knowledge include constructing meaning, conceptualising problems, and interaction with context. The connectedness between self and others is inescapable. Reasoning and learning in clinical practice can not be quarantined from the presuppositions of either therapist or patient (whether predominantly sound or otherwise) or from the wider influences on those presuppositions. The case for reasoning and learning to consider meaning, differing conceptions of problems, and interaction with context, and to approach this through a capacity to move between instrumental and communicative action, between formal and post formal thought operations, and between individual and social (including context) frameworks, would appear to be well supported in adult learning. It provides a basis for understanding many similar conclusions in the clinical reasoning literature of allied health regarding the socially embedded knowledge of expert practice and its preoccupation with interactive, collaborative, teaching and ethical practices (Benner et al 1996, Mattingly and Fleming 1994, Jensen et al 1999).