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Case Studies of Reading Processes and Strategies of Compensated Learning Disabled Adult Readers

by Mairi Douglas Egan

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of the University of Ottawa in partial fulfilment of the requirements
for the degree of Doctor of Philosophy in Education.

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Dedication

This thesis is dedicated to the memory of my father, Angus MacPhee of Fort William, Scotland, whose optimism and love of a challenge inspired me and to my mother, who taught me love of reading and courage in the face of adversity. Above all, it is dedicated to my husband John Egan, without whose steadfast love and support I would never have completed this thesis, also to my daughter Sheila, who is the joy of my life.

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Above all, I would like to acknowledge the role of participants in my study, who generously gave of their time and willingly talked to me about a personal, at times painful, part of their lives. Their courage in the face of daily challenge is an inspiration to those of us who can only guess at the human cost of having a disability.

Abstract

Little is known about how individuals with an identified disability in reading (also termed learning disabled or dyslexic) acquire adult reading competence and succeed in workplaces which demand high levels of literacy skill. There are some recent studies of successful individuals and university students who succeed despite a persistent reading disability, but these tend to focus on their deficits and problems rather than their strengths and abilities. Interventionists need this information and they have recently focussed on teaching LD students the reading strategies that skilled, non-disabled (NLD) readers use to improve their overall comprehension of text. This did not necessarily improve performance and transfer was a problem. More information is needed about the processes and strategies that enable LD readers to acquire skilled literacy competence, so that future intervention programs are based on proven compensatory mechanisms. Frith (1985) theorized that compensated LD readers can develop orthographic reading skills to overcome their disability but this required empirical investigation.

Stanovich's (1980) *"interactive-compensatory model of reading"* was supported by Kintsch's (1988) *"construction-integration model of reading comprehension"* as it provided a framework for exploring compensated reading. Within Enhanced Kintsch framework, compensated readers who had difficulty constructing a "textbase memory," or recalling text, used information from long-term memory to close gaps in word level comprehension. Readers could be aware of compensating in this way. Compensated readers were then able to construct a "model of the situation" and interpret text effectively, using building blocks of textbase memory. In this way readers were able to bypass their disability and comprehend text effectively.

Eight LD readers were given two texts to read and their responses to interview questions were audio-taped. Readers' recall performance was coded using a template textbase for each text, constructed using Kintsch's (1988) semantic propositional analysis system. Using inter-case as well as within-case findings, the following research questions were addressed:

How did compensated readers overcome their textbase difficulties? and

Are they aware of this?

The results showed that compensated readers had difficulty recalling the main ideas of texts,

particularly of unfamiliar texts, and often remembered only the supporting details. They overcame their textbase difficulties by using inference and metacognitive knowledge and strategies to close their gaps in understanding. This usually enabled them to successfully interpret or model the situation of text, although strong affective response to text could prevent readers from compensating this way. Strategies included rereading text to find the main idea and repeating unfamiliar words sub-vocally. The results also showed that compensated readers were sometimes aware of applying their compensatory processes and strategies.

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CHAPTER 1
INTRODUCTION

The eight participants in the present study are adults who have achieved success in their chosen career yet have also been identified as learning disabled (LD). Jeffrey is a research scientist who advises the government on agronomy. Keith works as an executive in a growing computer software company and holds a Master's degree. As the senior partner in a busy medical centre, Brenda holds medical and specialist qualifications. Belinda is a fully qualified nurse and office manager. Graeme teaches high school geography and has an honour's degree. Jack manages the computer system of a busy government department. As a qualified social worker and university researcher, Margaret provides counselling to young children with emotional problems. Natalie has a partnership in a successful catering business and is also completing her second year of an art's degree. All these individuals have had academic success and hold either a bachelor degree (in the case of Natalie a successful first year in a bachelor program), a Master's degree or a doctorate. They also have proven competence in professional work demanding a high level of literacy skill, as well as holding positions of responsibility, even of prestige. What makes this group of eight individuals outstanding however, is that they have achieved this measure of success despite having a learning disability (also called dyslexia or reading disability).

Torgesen (1998) found that as many as 1 in 10 persons in the North American population had a learning disability and that 80% of these individuals have difficulty learning to read and write. Most LD had an impairment in the auditory processing of language (Stanovich, 1980; Perfetti, 1996; Liberman, 1991), which was due to the speed and complexity of the speech stream (Tallal, 1980) and led to difficulty in accessing the sound-symbol relationship (phonology) of language (Stanovich and Siegel, 1994). A rare few had impairment in the visual or mixed auditory/visual processing of language. Typically LD students were slow to learn phonological reading and spelling skills and had social skill problems due to communication difficulties. Bruck (1998) found that disability in decoding unfamiliar words persisted in adulthood. Because

of their disability, many LD had difficulty achieving career and relationship success in life (Spekman, Goldberg and Herman, 1992) and developed negative coping behaviours.

However, some LD adults succeeded in university and demanding professions, despite persistent reading and spelling problems (Adelman & Vogel, 1998; Bruck, 1998; Everatt, 1997; Lefly, 1991). How they did so was of great interest to those trying to help struggling younger LD. Currently, much was known about the "problem" of LD, but little about the "solution" or how some individuals successfully compensated for their disability. Aware that the problem did not go away, interventionists recently turned their attention to study of LD success as a possible basis for intervention. Metacognitive reading strategy programs (Palinscar & Brown, 1985; Mastropieri & Scruggs, 1994; Wong, 1994) were set up to train disabled readers in the use of the kind of strategies non-learning disabled (NLD) skilled readers used. This has met with some success, but transfer of learning was a problem (Wong, 1991). More appropriate interventions were still needed to help the large number of failing LD students presently in the school system. Information about successful LD adults who had developed effective compensatory mechanisms could be used to plan future intervention programs.

The major difficulty in studying compensated reading was the lack of a theoretical framework within which to explore the unique blend of reading ability and disability that has been found in compensated individuals (Bruck, 1992). Current models of skilled reading could frame the skilled performance of these readers, but not their persistent phonological problems of compensated LD. Models of disabled reading, on the other hand, could frame the phonological deficit of compensated readers, but not their skilled reading ability. A new model of compensated reading ability was required, to ascertain compensated reader competence and identify compensatory processes and strategies. Current tools to study individual reading ability, such as achievements tests, provided quantitative data that was useful to compare LD to NLD peers, but not to reveal the subtle differences and compensations that could be expected in readers with a disability. Also, achievement test tasks often involved the reading of words or passages in isolation, unlike everyday reading tasks. Nonsense words and syllables, currently used to ascertain phonological disability in able LD adults (Bruck, 1992), lacked validity as an

everyday reading task. A new framework of compensated reading must be created to account for ability and disability of these unique individuals. Various models and theories in the literature could provide component parts of a compensated reading model.

Frith (1985) proposed orthographic skills helped readers to compensate for phonological difficulties. Within a bottom-up model of reading, orthographic skill was the highest level of reading development (Frith, 1985) and was critical to fluent reading and spelling skills. Like their NLD peers, young LD readers acquired first level, whole word reading or "*logographic reading skill.*" Over time and with experience in reading and writing whole words, NLD went on to recognise the sound-symbol relationship of the language and develop *"alphabetic skill."* But due to auditory process impairment, LD had extraordinary difficulty perceiving this relationship and "arrested" at the logographic stage. NLD readers through practising their alphabetic skills through writing then reading tasks, went on to develop higher, orthographic skills and to attain reading (and spelling) competence. Despite arrested development, Frith proposed, LD readers could, over time, and with exposure to language, acquire a large sight vocabulary through practise in logographic writing skills. This in turn, enabled them to develop more sophisticated word reading strategies or *"orthographic skill,"* and the ability to read and spell fluently, like their NLD peers. That is, LD readers bypassed their disability and became successful readers.

Stanovich (1980) also proposed a model of compensated reading. In his *"interactive-compensatory model"* LD readers used top-down reading skills to compensate for word-level difficulties. Bottom-up, word-level skills were on-line, word recognition processes that enabled readers to decode words in text. Top-down skills were expectancies and predictions from reader prior knowledge. LD readers processed text using bottom-up processes until they encountered an unfamiliar word, which challenged their decoding ability. The reader then switched to using top-down expectancies to close any gaps in understanding. This was an interactive process with LD readers changing levels of process to bypass any comprehension problems, and using top-down prior knowledge to compensate. Stanovich's model of compensation is a novel hypothesis in a field that is deficit oriented. But it requires empirical testing. Another framework of individual

reading ability may provide a tool for exploring Stanovich's theory.

Standardized reading achievement tests are often used to frame everyday reading ability, but they were designed to reveal quantitative rather than qualitative differences such as compensation for subskill deficiency among adult readers. Compensated readers usually performed like their NLD peers (Howard & Best, 1997) on these instruments, but their compensations remained hidden. Standardized test tasks also had limited validity since everyday reading tasks, such as in the Wide Range Reading Test - Revised (Jastak & Wilkinson, 1984), in which readers were asked to read aloud single words in isolation. This was a visual recognition task, not a reading comprehension task. Other tests required the reading of isolated sentences or paragraphs. A new framework of everyday reading was required to reveal the qualitative differences in processing text that could be expected between skilled and compensated readers.

Likewise, theoretical models in the field of reading research had limitations in framing compensated reading. Top-down models, such as Goodman (1967), could explain how compensated readers used their prior knowledge to predict meaning, but not how they decoded an unfamiliar word. Bottom-up models, such as Chall (1983), were made up of a hierarchy of reading skills, yet did not explain how disabled readers could attain competence despite lower-level, decoding difficulties. Interactive models, such as Rumelhart (1977), in which the reader created meaning using both top-down and bottom-up skills interactively, could frame compensated reading. But these models required elaboration to frame reading of everyday text and be situated within the disabled reader literature to account for persistent phonological deficit. Cognitive science models (Oakhill and Garnham, 1988) differentiated between the process and the mental model product of reading activity, and could be useful as a framework of the meaning construction processes of compensated readers. As well, cognitive models have been used to study skilled reading performance (Ericsson and Kintsch, 1991), the influence of reader resources, such as prior knowledge (Afflerbach, 1990), and text attributes, such as signalling (Meyer, 1975), on reader comprehension. Royer, Cisero and Carlo (1991) proposed a cognitive reading model that examines the reader's processes and mental model products, which are found in his verbal protocol. Reading ability can be assessed along qualitative dimensions, such as

efficiency of problem solving skills to overcome gaps in meaning construction, depth of problem representation, and efficiency of metacognitive learning strategies.

Kintsch's (1988) *"construction-integration model of reading comprehension"* provided a cognitive-linguistic framework within which the product of readers' meaning construction process was represented by dual-level mental models. Text was made up of a hierarchy of main ideas (macropropositions) and supporting details (micropropositions). Readers constructed a first level *"textbase memory"* from propositions they recalled from text, which were held in short term memory and integrated, in a cyclic process, with associated information retrieved from long-term memory. The textbase memory represented readers' recall of the text message. Good readers recalled the main ideas or macropropositions of the text, while poor readers usually recalled supporting details or micropropositions, and missed the main idea (E. Kintsch, 1991). Through further cycles of processing between short-term memory and nodes of association in long-term memory, readers created a second level mental model of text or *"model of the situation."* The model of the situation represented readers' interpretation of text and how they situated their "textbase memory" within what they already knew. Variables such as text structure and reader resources, such as prior knowledge, influenced individual reading outcomes. Royer, Cisero and Carlo (1991) proposed that Kintsch's model could be used to examine individual reading ability.

The reading comprehension model of Kintsch (1988) can be related to the compensated reading model of Stanovich (1980) and so provide a means of exploring compensated reading. Within this framework, readers used their on-line word recognition skills to comprehend text, and when challenged by an unfamiliar word, used their top-down prediction skills to construct their textbase memory, which represented their recall of the text message. Compensated readers with strong prior knowledge would have more information to repair comprehension than those with weak prior knowledge. When a text was poorly structured, or if the domain was unfamiliar to the reader, they could still close gaps in understanding by guessing at, or inferring meaning. Readers could add or delete information this way (Kintsch, 1993) and perhaps be conscious of doing so. Kintsch (1994) termed this creative process "learning from text" and showed that

readers so challenged could learn better from text than those who were not challenged. Kintsch (1993) proposed that the addition or deletion of information through inference could be a conscious or unconscious activity. Within the Enhanced Kintsch model, compensated readers comprehend text successfully by using inference and metacognition to compensate for their disability.

In a pilot study using the Enhanced Kintsch framework, (Egan, 1993) eight compensated LD readers were compared with eight NLD (non learning disabled) university readers. Both LD and NLD readers effectively interpreted the texts' main point, or global proposition. But while the NLD readers recalled 2 - 4 macropropositions and only a few (up to 3) micropropositions from the texts, the LD readers recalled only 1 or no macropropositions and many (up to 16) micropropositions. Although both groups interpreted the text the same, their recall and construction process differed. LD textbase memory was like that of poor readers (E. Kintsch, 1990) as it did not contain the main ideas of the text. NLD memory contained several main ideas and like that of good readers. Both groups constructed effective models of the situation of the texts and reported using various strategies to aid their comprehension, such as identifying the main idea, finding key words, drawing diagram of key ideas. LD used a wider range of strategies more often than did NLD and were aware that they used a repertoire of strategies to compensate. The Enhanced Kintsch model was useful in revealing the qualitative differences of the reading processes between and among LD and NLD groups and individual readers.

Most LD students do not become compensated readers and have difficulty achieving workplace success (Torgesen, 1998). Current information about adult LD was largely negative and deficit-oriented. The participants in this study (Jeffrey, Keith, Graeme, Jack, Natalie, Belinda, Brenda and Margaret) have compensated for their disability and succeeded in the workplace. An Enhanced Kintsch model of compensated reading was useful in exploring how these compensated readers processed text, what compensatory strategies they used and whether or not they were aware of compensating.

This chapter contains the introduction to the present study. Chapter 2 contains a critical review of the literature related to compensated reading and individual reading ability. Chapter 3

describes the methodology used in this study, as well as that in the pilot study, outlining why changes were made for the present study. Chapter 4 contains a description of the performance of each participant or case, as well as an inter-case analysis of the participants' performance, their reported reading strategies and awareness of their own process. Chapter 5 contains an interpretation of the findings related to the two research questions and conclusions from the study. It also contains acknowledgement of the study limitations and implications for future research.

CHAPTER 2
CRITICAL REVIEW OF THE RESEARCH LITERATURE

A study of reading processes and strategies of compensated learning disabled adult readers necessarily begins with a review of the literature about individuals who succeed despite learning difficulties. There are two strands in the literature related to compensated learning disabled reading.

One strand relates to LD reading and compensation. The other relates to skilled reading ability and reader resources. There was much information in the LD literature about the specific deficits found among disabled readers, but very little was known about how these readers learn to compensate. There is strong evidence that, compared to NLD readers, LD readers use different neurological pathways to read. But this information cannot be directly translated into classroom interventions. A recent shift in the field of LD from study of deficits to study of compensation and success provided some findings, but these were constrained by a lack of rigour in the parameters of those initiatives.

The second strand of information in the literature is based on skilled reader ability. Compensated readers are skilled readers, who can use the same processes and strategies as their NLD peers, yet can be expected to have some processing differences. Models of reading in the literature provide some theoretical insights into the processes skilled readers use to comprehend text. Instruments that are currently used to examine individual reading ability are quantitative and facilitate comparison among same age readers. These instruments do not provide qualitative information about same ability readers, including those who may be compensating for a reading disability.

A framework is needed to explore how compensated readers process text effectively and what strategies they used to achieve this outcome. The review of the literature proceeds along these two lines of thought.

Compensated LD Reading

Compensated LD readers are those who are identified as having a reading disability, usually in phonological process, yet achieve average or above competence in reading. They can be identified in grade school due to their difficulty in acquiring age-normed literacy skills, or as adults when they experience serious study problems for the first time.

Howard and Best (1997) examined the reading skills of Melanie-Jane, an 85-year-old woman, who had both normal word reading ability and impaired phonological skills. Using standardized tests, Melanie-Jane was assessed as having above average intelligence and average reading skill ability, but she also had extreme difficulty reading phonemes in nonsense words and performed at the level of a nine-year-old child. Based on this error pattern, Howard and Best suggested that Melanie-Jane had phonological dyslexia even though she had not experienced any difficulty learning to read in school. She had acquired reading competency despite her disability, which she attributed to the whole word reading instruction she received in elementary school.

Hanley (1997) examined the reading skills of thirty-three dyslexic university students. Thirty students in the group had problems performing non-word reading tasks and when reading normal text, showed a phonological skill deficit in decoding unfamiliar regular words. Three students appeared to have a mixture of phonological and other subskill disability. All thirty-three had learned to read in school. On tasks using university-level texts, they were all slow and sometimes inaccurate readers.

In a study of LD adults who needed help for dyslexia as children, Bruck (1998) found that 75% of them continued to show the same pattern of difficulties in decoding phonologically regular words (such as "gave") and irregular or exception words (such as "have"). She attributed this difficulty in accessing the sound-symbol relationship of the language to a persistent phonological skill deficit in otherwise competent adult readers. However, Bruck (1990) found that the reading skills of LD adults were slower than that of their NLD peers, even those LD readers with a fairly high level of word recognition skill. She proposed that compensated readers had both quantitative and qualitative deficits in their reading. Quantitative deficits included

speed and accuracy of word recognition. Qualitative deficits included the utilization of different sources of information to identify words.

Persistent LD phonological deficits were also found by Leong (1999) who studied phonological and morphological processing in LD university students and found it to be slower and less accurate than reading-matched and age-matched controls. Rack, Snowling and Olson (1992), Everatt (1997), Campbell and Butterworth (1985) and Felton, Naylor and Wood (1990) also found persistent phonological skill deficits in otherwise competent LD adult readers.

Other researchers have attempted to find out how compensated LD overcome persistent reading problems. Wise and Olson (1991) suggested that effective LD readers use context cues and comprehension skills to compensate for difficulties in reading. Bacon and Carpenter (1989) found compensated readers used text rhetorical structure to predict the meaning of text. In a study of successful LD college students, Brozo and Curtis (1986) identified two kinds of reading strategies readers used to help in comprehension of text. Firstly, readers used meta-level word attack strategies to make sense of text, such as use of text structure cues, associated knowledge and learning skills. Secondly, they used two macro-rules for summarizing text, including deletion of less important information in text and generalization of text ideas. Able LD learners combined these two strategies with being aware of their own understanding, their problem solving skills, taking responsibility for their own success, getting tutorial help and avoiding the use of deficit skills to effectively process text.

Still, other researchers have attempted to explore the resources that support LD compensation and found that intelligence, persistence, strong social skills, self-awareness and taking responsibility for their own learning helped individuals overcome their disability (Spekman, Goldman & Herman, 1992; Morris & Leuenberger, 1990; Adelman & Vogel, 1998; Vogel & Adelman, 1998). Adelman and Vogel (1990) found that successful LD adults depended upon metacognition, or learner self-understanding, to plan how they would carry out a task, to evaluate their own performance and to solve their own problems.

Siegler and Campbell (1989) suggested that many successful LD learners had to overcome their impulsive cognitive style and become more reflective, using inner language to

mediate their own learning. Inner language mediated between individuals' inner thoughts and their actions in the environment. Weller, Watteyne, Herbert and Crelly (1994) found that successful LD adults showed metacognition in their self-awareness and control, in their acceptance of their disability, appropriate goal setting, persistence in meeting goals, good communication skills and realistic coping strategies in diverse social contexts.

Ferri, Gregg and Heggoy (1997), in a study of gifted LD, found that individuals tried to hide their disabilities by using their strengths to compensate for weakness, such as by using visual diagrams rather than language. In a study of able LD college students, Ganschow, Coyne, Parks and Antonoff (1999) found that 50% were undiagnosed before entering college and had managed to "pass" undetected through elementary and high school. They suggested that unknown numbers of highly intelligent LD may learn to compensate by themselves and never be identified by educators or clinicians. For some of these able individuals, compensations were over-learned and they were unaware of compensating.

Kerschner, Kirkpatrick and McLaren (1995) examined the abilities of B.I., a 39-year-old man, who had experienced severe difficulty in learning to read in school and had left school in junior high. Despite early reading problems, B.I. acquired grade 12.2 reading skill ability on the Wide Range Achievement Test reading tasks (Jastak & Wilkinson, 1984). He was a highly successful computer company owner and president, who still had difficulty reading and remembering text, despite achieving gifted range scores on the Wechsler Adult Intelligence Scale (Wechsler, 1986). Kerschner, Kirkpatrick and McLaren (1995) found that B.I. had poor reading and writing skills, spatial confusion, a severe deficit in speed comprehension, and an episodic memory loss due to a neurological dysfunction. Despite these deficits, B.I. had developed strong coping mechanisms and compensatory strategies to avoid language processing tasks, such as by having others read and report orally to him on what was written. He had also chosen the computer technology field that, he said, "played to his strength." Kerschner et al (1995) suggested that the key to this individual's success was the creation of a strong management team, able to provide the skills he lacked. B.I. exerted a strong control over himself, his team, and his work environment. He was the natural leader of the team because the other members recognised

and admired his unique creative problem-solving skills and his outstanding holistic reasoning skills. But the team acknowledged in an interview that it was B.I.'s ability to inject creative questions in business meetings, a "form of hypothesis-testing," that resulted in major improvements and innovations in company production and was integral to the company's success.

Kerschner et al (1995) found that B.I.'s network of human and technological compensations "buffered" his disability in the workplace and enabled him to succeed. His high intelligence, expressive language abilities and drive to succeed, had helped him to overcome persistent difficulties in receptive language tasks. His awareness of his own limitations and the ability he had developed to control his work environment, enabled him to anticipate, cope with or prevent difficulties. B.I. knew he had language difficulties and perceived himself as different to others. He alternated between feeling mentally retarded and emotionally disturbed and feeling brilliant and fortunate. It was only as a highly successful adult that he felt safe in seeking a professional explanation for his uniqueness.

Bassett, Pollaway and Patten (1994) proposed a life-span model of successful LD adult development. Four variables were important in the adaptation of the individual to the environment: intellectual-biological (physical well-being, memory); socio-emotional (relationships, support systems); past experience/future anticipation (influence of previous success or failure); and locus of control (perceptions of control of own life). Control was considered the most important success attribute. Rogan and Hartman (1990) also studied successful LD adult outcomes and found metacognitive strategy training in reading, intensive school remediation, counselling and parental support were critical to LD success. Entwhistle (1995) found effective LD learners have three coping strategies: ego-oriented (failure avoidance); social (dependence on others) and task related (creative problem solving). Of these, developing task-related strategies alone ensured success.

Gerber and Reiff (1994) proposed that creative problem solving or "learned creativity" was at the heart of LD adaptation. Successful LD developed novel ways of doing things that tapped their strength areas. In a study of LD success, they found that the individual's ability to

compensate was much improved by actively seeking social support through networking and finding a mentor. It was also important to LD success that the context of individuals' learning was compatible with their learning style. This was necessary in order to accommodate their different way of doing things. Highly successful LD celebrated their achievements, shared their innovative way of doing things with others, and perceived themselves to have gained advantage from their disability. The key to LD compensation was control, which Gerber and Reiff (1994) characterized as including both internal personal decisions and the external activity reflecting those decisions. Internal decisions included a strong desire to succeed, setting and achieving of personal goals, and viewing oneself as competent. External behaviours included ability to fit in, assimilate and persist in the face of difficulty. While poor LD readers have been found to lack metacognitive knowledge and skills (Swanson, 1993; Roth Smith, 1991; Palinscar, 1986; Swanson, Christie & Rabineau, 1993; Wong, 1994; Borkowski, Weyhing and Turner, 1986) and have difficulty using strategies they have been taught in new contexts (Palinscar & Brown, 1985; Wong, 1991; Chan,1991), compensated readers knew what they needed to succeed and were persistent in ensuring that they received it.

Adult LD readers succeeded in developing reading skill competency despite their disability. They were both skilled and yet disabled readers. In order to understand the development of their reading skill, a framework was required that can frame both regular and compensated reading development. The model of Frith (1985) framed both LD and NLD reading development and can be used for this purpose.

Frith's (1985) Model of Compensated LD Reading Development. Frith's (1985) proposed a model of LD reading and spelling development in which all young readers learned to read to visually recognize whole words (or "logographs") through frequent exposure. Frith called this initial stage, the *logographic stage* of reading development. Seymour and Elder (1986) in a study of primary (grade) one reading, confirmed that all elementary readers go through this first stage. Readers developed logographic skill, or a sight vocabulary. Over time and through repetitive exposure to words, they were gradually also able to spell words in their sight vocabulary. At the first logographic stage, reading skill drove the development of writing and

spelling skill. At the second *alphabetic stage*, repetition in writing the letters of words led readers to an awareness of word parts, or phonemes, and the relationship between written symbols and the spoken sound of language (or phonemes). Again, over time and with repetition in writing words, readers were able to acquire phonological or alphabetic reading skills, which enabled them to decode unfamiliar words, and to read familiar words more quickly. At the alphabetic stage, writing drove the development of reading skill. As individuals continued to practise their reading skills, they gradually acquired awareness of larger, orthographic chunks of words, a higher, more sophisticated level of morphological knowledge. At the third *orthographic stage* of development, reading drove writing development. Learners first gradually acquired knowledge about the orthographic code of language, which led to the development of orthographic skill in reading and then in writing. At this highest level, the individual developed reading and writing skills that were fast and accurate. NLD readers developed skills in each of the three hierarchical stages sequentially over the developmental period.

On the other hand, Frith (1985) proposed that the LD reader took a different pathway to reading skill competence. Firstly, he (the convention of making LD readers male rather than both genders will be adopted for simply, although there are both) was able to develop logographic skills in reading then writing. At the first logographic stage, the LD reader started literacy development in much the same way as NLD peers, by developing a sight vocabulary and by learning to write "logographs" or whole words although progress could be slow.

However, repeated exposure to reading and writing whole words did not lead him to perceiving the sound-symbol relationship of language. With typical problems in the auditory processing of language, the LD reader had great difficulty recognising phonemes and internalizing the alphabetic code of language. The rehearsal and retrieval strategies used by NLD children at this stage, such as repeating the word sub-vocally as they wrote down letters to aid recall of the alphabetic code, did not help the LD reader since the auditory or "alphabetic" route to word recognition was impaired. Without alphabetic skill, he relied on his sight vocabulary, logographic or visual recognition skills, which was a slower and less effective way of decoding unfamiliar words. LD used sight reading rather than sounding out phonemic units of words, thus

producing visually similar approximations such as "horse" for "house, or semantically related words, such as "home" for "house." Frith proposed that LD readers, therefore, "arrested" at the logographic stage of reading development and did not acquire competency in second stage alphabetic skill. This led to difficulty in decoding and spelling phonologically regular words.

Over time though, the LD reader learned to compensate for this. He was able to use his intact logographic skills to build up an extensive sight vocabulary and recognise, code and reproduce whole word units (logographs) or word parts (morphemes). With these resources LD readers acquired Stage 3 orthographic skills despite lower level arrest. By using larger, orthographic chunks of words to recognise unfamiliar words, the LD reader bypassed his "phonological dyslexia" difficulties, and in time he developed orthographic skill and competence in reading. Breakdowns occurred only in the reading of unfamiliar words, when the reader needed alphabetic decoding skill, and individuals could learn strategies to deal with such challenges. Frith (1985) proposed that both LD and NLD readers became competent adult readers by acquiring Stage 3 orthographic skill, although LD readers took a different route in developing this competence.

Spear-Swerling and Sternberg (1994) also supported an "alternate" route to compensated reading, which enabled individuals to overcome alphabetic difficulty by building upon areas of strength in logographic, then orthographic processing. By taking an alternate route, LD readers used orthographic coding skills to decode unfamiliar words and were not held back by lower level, alphabetic difficulty. Impairment was only evident when LD readers tried to read unfamiliar words for which they had no logographic or orthographic knowledge and had to employ strategies such as using a dictionary to do so.

Orthographic Skill and Compensated LD Reading. The key to overcoming alphabetic arrest in LD reading, was development of orthographic skill (Frith, 1985; Spear-Swerling and Sternberg, 1994). However, researchers in the field varied considerably in how they defined orthographic reading skill. Stemmer and Whitaker (1998) defined orthographic processes as the visual processing of language, which helped readers retain larger morphological word chunks, a "re-description" of earlier logographic sight vocabulary. They suggested that helping LD

students acquire central orthographic processes to compensate for alphabetic difficulties, was an effective intervention. Vellutino, Scanlon and Tanzman (1994) defined orthographic coding as:

> the ability to represent the unique array of letters that define the printed word as well as general attributes of the writing system such as sequential dependencies, structural redundancies and letter position frequencies. (p 314)

Vellutino, Scanlon and Tanzman proposed that orthography facilitated recognizing and reproducing the complex code of the language including its "vagrancies" and exceptions. Olson, Forsberg, Wise and Rack (1994) defined orthographic coding as a means of word identification "without phonological mediation." It was a means of coding language, which was different from, and not necessarily dependant upon, phonological ability. Perfetti (1996) suggested that orthography was a basic cognitive ability, which underpinned lexical access or word identification in fluent reading and was related to correct spelling. Orthographic skill helped LD readers to compensate for lower level difficulties. Stanovich, West and Cunningham (1991) proposed that orthography was not so much a separate skill, as the result of the reader's experience with language and exposure to print.

Many other researchers identified orthography as a component of LD compensation (Frith, 1985; Spear-Swerling & Sternberg, 1994; Hough, 1990; Segalowitz, Wagner & Menna, 1992). Some suggested that the orthographic coding abilities used by disabled readers relied on direct visual access for word level processing (Frith & Snowling, 1983; Siegel, Share & Geva, 1995; Stanovich & Siegel, 1994). Bacon and Carpenter (1989) found disabled readers used orthographic skill as well as awareness of the semantic structure of a text to predict meaning. Bruck (1992) found compensated readers developed orthographic ability, which encompassed sophisticated word knowledge and more global comprehension processes, to compensate for word-level problems. Their word attack skills relied on visual rather than auditory lexical access. There was however, considerable variation between researchers in the field, as to the nature of orthographic compensation and how it helped LD readers to overcome on-line difficulties in everyday reading.

Findings in the medical field related to LD support the alternate route theory. Galaburda (1986) and Geschwind and Galaburda (1987) found that LD readers used different neurological pathways and areas of the brain to process language compared to NLD. They used brain sites associated with visual rather than auditory process to decode unfamiliar words. LD readers also used the right hemisphere (RH) of the brain to read compared to the left hemisphere (LH) usage of NLD. Morton and Siegel (1991) found LD readers who used the RH to read, developed strength in orthographic skills that aid in meaning construction. Hough (1990) and Segalowitz, Wagner and Menna (1992) proposed brain RH processing of language enabled disabled readers to access the orthographic code of language and successfully comprehend text. However, Hutner and Liederman (1991) used neuro-imaging techniques to show that reading was a whole brain activity in which all readers used different neurological pathways within the brain to process text. They proposed that LD readers were within a continuum of individual reader diversity and only became disabled when some aspects of the reading task, such as inappropriate early literacy tasks, lack of individual support, insufficient time to learn, ill-health or relocation imposed too great a stress on the individual's ability to adapt his learning style to that required in school reading.

To frame the abilities and disabilities of compensated readers and find out what it is that individuals do to succeed in making sense of text, a model of reading was needed that could account for both the reading competencies and the compensatory mechanisms of individual readers. The model of Stanovich (1980) can be used.

Stanovich's (1980) Interactive-Compensatory Model of LD Reading. Stanovich (1980) proposed an interactive-compensatory model of reading that drew upon Klahr's (1978) original information processing model of human cognition. The model was based upon Rumelhart's interactive model (1977) in which readers used bottom-up and top-down process interactively to make sense of text, defaulting to top-down process when breakdowns occurred in bottom-up word processing. In his dual-level model, Stanovich proposed NLD readers had fast lexical access or ability to attach meaning to words due to encapsulated word recognition skills. These modular abilities enabled readers to quickly retrieve information from their long-term memory

bypassing working memory, in order to decode words quickly and efficiently. The reader's cognitive resources were not tied up in low level, processing of word chunks in short term memory and were available for use in higher level construction of meaning. If a word in text was unfamiliar, NLD slowed down and used non-modular processes in short-term memory to aid bottom-up decoding. They moved between the two levels in reading, using fast, modular on-line reading, top-down inference and bottom-up decoding interactively to make sense of text.

The LD reader also used top-down and bottom-up comprehension processes, but with weak bottom-up decoding skills, due to phonological problems. Lacking a fast, efficient modular lexical access ability, much effort was devoted to preserving on-line coherence. When the LD reader encountered an unfamiliar word, he or she had to use non-modular, cognitive resource to identify familiar word parts and evaluate information retrieved from prior knowledge to find associated information with which to close the gap in understanding. This activity was slow and took up much of available reader resources, leaving little for higher level meaning construction. Because of this, Stanovich proposed that LD read slowly and can only hold a limited amount of information in memory at one time. There was a danger that the LD reader would forget information, make errors, or focus on comprehending word level details instead of the text main ideas.

Top-down processes helped LD compensate for lower level weakness. With relevant prior knowledge, the LD reader used top-down expectancies to close gaps in understanding text and comprehend effectively. When the reader's bottom-up processing failed, top-down process can compensate and close the gap in understanding. LD reading was an interactive process and with the reader using top-down inference to overcome word-level problems. By shifting between the dual-levels, the LD reader was able to overcome word level problems and prevent loss of more global understanding of text message while dealing with unfamiliar words.

Compensation within Stanovich's (1980) model, occurred when a deficit in one knowledge source (text information) during on-line reading caused the reader to rely more heavily on other knowledge sources (such as prior knowledge), regardless of whether this was a high or low level process. LD readers used top-down context clues, or visual chunking strategies

to fill any gaps in understanding and alternated between levels to maintain speed, accuracy and global comprehension. Reader self-awareness (metacognition) helped in monitoring understanding, identifying difficulties and initiating repair strategies. Readers perceiving a difficulty, could switch from on-line word recognition to knowledge-driven inference to repair meaning construction.

Prior knowledge supported LD compensation in Stanovich's (1980) model and was widely recognised in the field as facilitating reading comprehension (Afflerbach, 1990; Kletzien, 1991). Compensated LD adults can draw upon their prior knowledge to overcome persistent word level difficulties. They can also develop task-related strategies such as predicting meaning, deleting irrelevant and generalizing relevant information, and meta-level word attack skills such as orthographic skill to overcome decoding difficulties. Stanovich's (1980) interactive-compensatory model of reading showed how LD readers used higher level, top-down processes to compensate for bottom-up difficulties. Metacognition (Garner, 1987) also aided higher level process and could be added to the Stanovich model of compensation. While Stanovich (1980) provided a broad theory of how compensated readers overcame reading problems, it required elaboration before testing.

Individual Reading Ability

Compensated LD readers become skilled readers despite word level difficulties. Current models of reading ability are designed to either assume all readers process text in a similar way, or assume subskill competence as a necessary prerequisite for competence and are used for subskill assessment purposes. They do not account for the unique blend of strengths and weaknesses found in LD reading. A model of reading is needed that includes the individual reading abilities of those who can read competently yet have to compensate for a disability.

In the literature, reader ability is categorized as good or bad, the latter including readers who are culturally disadvantaged, have low intelligence or a reading disability. Skilled reading has also been examined to explore the processes and resources that underpin effective

comprehension. The LD literature did not fully frame skilled reading of compensated readers. The literature did not frame the disability of some skilled readers. Compensated readers had a unique blend of "poor" reading ability, having persistent decoding difficulty, and "skilled" ability in acquiring high levels of literacy competence. A new framework was needed to frame compensated reading and to provide a window on dynamic use of compensation in reading. The framework should be fine-grained enough for close examination of how individual readers construct meaning on-line and flexible enough to represent everyday reading tasks.

Standardized tests are currently used to assess adult LD reading ability and can provide evidence of the skilled performance of compensated readers. Ferri, Gregg and Heggoy (1997) examined assessment profiles of 94 able LD college students, some of whom were gifted, and found that standardized assessment instruments did a "poor job" (p. 558) of identifying individuals' strengths and compensations. Standardized tests provided only a quantitative measure of reading competence compared to peers and provided no qualitative data on individual differences or compensatory strengths. Raskind, Gerber, Goldberg, Higgins and Herman (1998) also found that standardized reading achievement tests did not reveal the reading difference, processing abilities and coping mechanisms of compensated readers. In a survey of the literature, they found there was little longitudinal study of successful LD outcomes and proposed that interventionists needed this data to understand compensated reading and plan effective interventions.

There are many theoretical models in the field of reading that attempt to explain the dynamic process of reading. Each could illuminate different dimensions of the dynamic between the reader and the task in making sense of text and also establish a role for reader resources in skilled reading ability.

Models of Reading. *Top-down or psycholinguistic models* (Goodman, 1967; Smith, 1975; Anderson, 1984) were those in which reading was primarily dependent upon the reader's intention, or purpose for reading a text. Readers did not read every word in the text but used expectancies drawn from prior knowledge to construct text meaning and semantic/syntactic context cues to "guess" about the meaning of unfamiliar words. Information such as knowledge

of the world and of print structures, helped readers to predict and hypothesize about meaning. Anderson's (1984) schema theory in which schemata within a reader long-term memory store (constructed through previous learning) are activated during text processing, was one such model. Schemata provided readers with a "script" or "plan" based on prior knowledge, which activated reader expectancies of text meaning. Recalled schema are matched by the reader with information extracted from text to help individuals actively construct meaning. Each reader brought his own unique schemata to the task. Reading effectiveness depended upon having relevant schema in memory store and using predictive abilities. Poor readers used this holistic, top-down view of reading to overcome word level difficulties (Clay, 1987).

Some researchers disputed the strong role of prior knowledge in skilled reading. Ehrlich (1996) found that skilled readers read every word in text only using top-down expectancies when their on-line word recognition skills broke down. McKoon and Ratcliffe (1995) proposed a "minimalist" theory in which good readers only made minimal inferences from prior knowledge while reading in order to preserve on-line coherence. Stanovich (1988) found that NLD readers read every word in a text and had strong word recognition skills or "lexical access" but poor readers relied on their prior knowledge and used top-down strategies as a default to overcome difficulties when word recognition skills broke down. However, McNamara, Miller & Bransford (1994), suggested that while top-down models of reading can be used to explain the role of prior knowledge in reading, they do not adequately explain how readers comprehend unfamiliar words or inconsistent text.

Bottom-up models of the process are often used to explain word level processing and to uncover the subskill impairment usually found in disabled reading. The hierarchical model of Chall (1983) and Wiig and Semel (1984) are examples of a bottom-up view of language and reading development. Reading was represented by a hierarchy of subskills in which the reader must master lower level skills in order to gain higher level competence. In particular, after readers have acquired an initial sight vocabulary, they must acquire phonological skill, that is access the sound-symbol relationship of the language, in order to be able to decode unfamiliar words and read text fluently. Much of the LD reading research has been based on bottom-up

models of the process. This framework has been used by psychologists and resource teachers trying to diagnose why an individual had extreme difficulty acquiring literacy skills and to plan interventions to remediate deficient subskills. Many reading assessment tools are based on a bottom-up model of reading.

Underlying the subskill assumption of bottom-up models, was the theory that readers had a "limited capacity mechanism" (LaBerge & Samuels, 1974) that can only process a small amount of information in short term memory at a time. By progressively acquiring more sophisticated reading subskills and the ability to process more complex information, the reader did not overtax his processing capacity. Good readers had fast, even automatic, word recognition skills, leaving memory capacity for higher level understanding processes, while poor readers had slow and inaccurate decoding skills as well as problems reading unfamiliar words. However, while a bottom-up model could be used to explain the effect of phonological deficits on reading development, it did not adequately explain the role of prior knowledge, reader metacognition and affect in reading comprehension. Nor did it frame the comprehension process of compensated readers who had persistent decoding problems, yet achieved reading competence. The bottom-up model was designed to identify disability not ability.

An *interactive model* was proposed by Rumelhart (1977) in which reading was viewed as the interaction of many of component processes that occurred in parallel. To make sense of text, readers used prediction processes (top-down) and word recognition sub-processes (bottom-up) interactively. Readers predicted meaning and identified words in a reciprocal and simultaneous manner. Rumelhart proposed that to read fluently, the reader must have four kinds of knowledge: orthography (letters, sounds, spelling patterns); lexicon (words); syntax (sentence patterns); and semantics (meaning of words). By drawing upon all these sources at the same time, through both downward and upward processing, the reader could comprehend the text message. Stanovich's (1980) interactive-compensatory model was an extension of Rumelhart's model, proposing that LD readers used top-down and bottom-up processes interactively, compensating for bottom-up, or decoding difficulties by using top-down expectancies.

Cognitive models of reading are hypothesized (Perfetti, 1996; Oakhill & Garnham, 1988;

Kintsch, 1985) by researchers from diverse fields such as psychology, linguistics and philosophy. Cognitive models differentiated between the cognitive processes used in constructing meaning and mental products or representations of this process. They originated in the information processing view of reading and constructivist theories of human cognition and are "internal" in proposing that the reader constructed the meaning of a text for himself in the form of a mental model. Other reading models could be characterized as "external" in describing observable behaviour and originating in positivist research.

Cognitive models are less concerned with memory of what was read and more concerned with what the reader does with text information, how he transforms it into his own internal version of the text. That is, reading was not just reader recall of the text message, but rather the individual's interpretation of that message. Related theoretical underpinnings included Vygotsky's (1978) inner language in which individuals recreated for themselves internally, the external world with texts being a tool in this process. Chomsky (1965) was also a strong influence on linguistic and cognitive theory, in differentiating between the "surface" meaning words represented in a text, and the "deep structure" of language, an innate level of understanding that is more complex than that of surface meaning of words. In cognitive models, texts were recognised as having a surface or explicit meaning, and also deep or implicit meaning. Readers constructed their own understanding of a text based upon what they perceived as the text message or "deep structure."

Two important theoretical components of cognitive models are mental model theory and text structure theory. Mental model theory was an attempt to account for the complex interactions of reader, task and context in everyday reading and to distinguish between the process and mental model product of this activity (McNamara, Miller & Bransford, 1994; Oakhill & Garnham, 1988; van Dijk & Kintsch, 1983). Understanding text was viewed as being more than "top-down" reader predictions or "bottom-up" word decoding and even interactions of the two. Rather, it is both the extrapolation of meaning from text and interpolation of reader goals and expectancies. Mental models were constructed as a result of the interactions between reader, text and context, and represented how the reader recalled the text message and how he

situated this information within what he already knew of the world. The mental model was a new version of text created in memory by the reader. Readers adapted and amended their mental model as they read, based on new information. Reader attributes and text attributes alone did not account for all of the memory trace in short-term memory. Factors such as context or affect also influenced reader models. The mental model represented the product of reader cognition and could be used as a diagnostic tool in study of individual reading ability. Reading ability was not static but was instead dynamic, changing over text and task.

Text structure theory related to the effect of text structure on reader recall (Meyer, 1975; Kintsch, 1998; Fredriksen, 1975). An example of this was that well constructed text was easier to remember than poorly organized text (Kintsch, Mandel & Kozminsky, 1977; Meyer & Freedle, 1984). Attributes of text that influenced reader recall included coherence of text message (van Dijk, 1995), the "levels effect" (Kintsch, 1974) and cohesion of text rhetorical structure (Chapman, 1981; Kintsch, 1998). The "levels effect"or hierarchical principle (Kintsch, 1974) in which higher level idea units of text structure (that contain important information from text message) were better remembered than lower level idea units containing information less important to text message (Kintsch & Keenan, 1973; Zerhouni, 1996) influenced reader outcomes. Good readers recalled the main ideas, better than supporting ideas, of both narrative and expository texts (Mandler & Johnson, 1977; Kintsch 1974). Good readers perceived and ranked text ideas, recalling those that were important to text message or main ideas (E. Kintsch, 1990). Poor readers recalled few if any main ideas. Meyer (1975) found readers remembered texts in which main ideas are "signalled," for example, placed in the first sentence of a paragraph, better than those without signalling and this effect remained over time. Although the "levels effect" influenced reader recall, its effect on reader interpretation was unclear. Cohesion or grammatical organization of text was also important. Texts with good grammatical structure were easier to recall than those with poor structure, because cohesive links between ideas improved reader memory of text ideas between sentences and over paragraphs (Chapman, 1981).

Kintsch (1994) found that well-structured text aided reader recall, but it did not aid reader interpretation or learning from text. On the contrary, in a study of adult reading, he found that

readers who had to overcome comprehension difficulties interpreted text more effectively. He manipulated a medical text about human heart function in order to show the effect of good and of poor text structure on learning from text. Readers recalled well-constructed texts better than poorly-constructed ones, but they interpreted poorly-constructed better than well-constructed texts. Being challenged by difficult text forced readers to work harder to comprehend and this improved their learning from text, Kintsch proposed. Well-structured text was often not challenging enough for the reader to activate learning activity. Compensated readers, who must work harder to comprehend text, can successfully understand and learn from challenging text. Having a disability might impair their recall of text, yet not their interpretation of text.

Constructionist theories of human cognition like that of Holland, Holyoak, Nisbett and Thagard (1986) also proposed that having to close gaps in understanding improves an individual's learning. Holland et al proposed a theory of learning in which individuals constructed a mental model from building blocks of information about the environment and inferred association retrieved from long term memory. When new information was puzzling and individuals were unable to deduct meaning or infer association, they could guess at, or "induct" meaning. Learning in this way was a rule-governed activity with careful matching of new and known information, and of overcoming gaps in understanding by use of new conceptualizations and combinations of existing knowledge. Creating meaning from what they already knew, enabled individuals to learn from challenging new situations. Holland et al (1986) applied their theory of learning through induction to social learning, which could also be applied to reading. In reading, readers without prior knowledge or poor decoding ability can infer meaning of text.

Kintsch's (1988) Construction-Integration Model of Reading Comprehension. Kintsch (1988) proposed a cognitive-linguistic model of reading (see Figure 1) in which readers constructed a dual-level mental representation of text in memory, as they processed the surface meaning or *textbase template*. The textbase template was made up of semantic propositions representing ideas in text, which were hierarchically ordered into a higher level

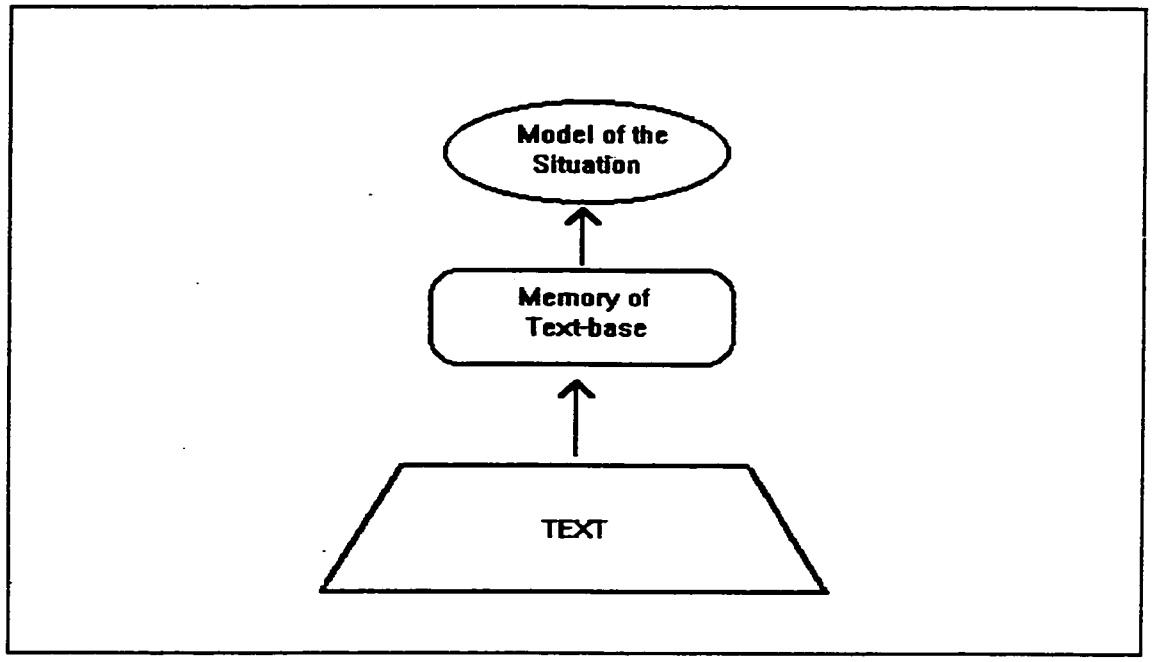

Figure 1: Kintsch's Interactive-Compensatory Model of Reading Comprehension

(Taken from Kintsch (1988))

"macro-structure" of the main ideas in the text (or macropropositions), and a lower level "micro-structure"of supporting details (or micropropositions). Macro-level propositions subsumed micro-level propositions and provided more general conceptual reference. A proposition was defined as "a unit of conceptual information corresponding to the meaning of a sentence" (p. 112) (van Dijk and Kintsch, 1983) and represented the relative conceptual meaning of words within the context of the text message. A proposition consisted of a predicate and one or more arguments (Kintsch, 1988), which are concepts or other propositions that are classified in terms of their semantic case roles. Kintsch's discourse analysis system originated in the case grammar work of Fillmore (1968) and was a means of representing the meaning or semantic conceptual structure of a text.

Textbase Memory. As readers interacted with text, they retained ideas or semantic propositions from the textbase template in memory. They used these propositions as building blocks to construct a first level mental representation of the text, the "*textbase memory*." At the same time, the reader searched his long-term memory and integrated associated information with his textbase memory. Kintsch (1988) proposed there are several steps in textbase memory construction. Firstly, the reader activated propositions corresponding to what he remembered of the text within short-term memory. Secondly, he elaborated the retained propositions by activating what he already knew in long-term memory, by which he could infer additional propositions or concepts. Thirdly, the reader evaluated the efficacy of this process and assigned "strength value" to proposition/concept pairs, keeping some in memory and discarding others.

Textbase construction was a complex, cyclic process in which constraint satisfaction must be achieved between the reader's recall of text and his prior knowledge, and in which macro-rules govern construction. Kintsch (1988) suggested the reader activated "nodes" of association from long-term memory, which are assigned a "strength" value. Retained information must meet the rule constraints of each cycle of activation, and subsequent associations must meet these conditions. Readers evaluated the relative associative strength of propositions retained, retaining or discarding propositions depending on the assigned strength. In this way, readers tried to achieve a 'best fit" between recalled text propositions and their knowledge of the world. This

was a bottom-up process which was cyclic, with a cycle occurring for each sentence. Readers generated a model of the situation by further recycling relevant propositions, by holding onto and strengthening them, and by allowing irrelevant or inconsistent propositions to decay. Rules are weak and flexible in response to the changing nature of the world.

Kintsch (1988) proposed three macro rules governed textbase construction:

1. deletion of unsupported propositions.
2. generalization or replacing several propositions with a superordinate one.
3. construction or joining sequences of propositions with a common element.

The reader applied these rules to ongoing textbase construction processes, losing or gaining building blocks of information. Propositions retained after complying with the macro rules, are processed along with those from the next sentence. In this way overlapping between sentences allowed readers to maintain coherence. Information was added or deleted by the reader during cycles of process. The result was a first level "textbase memory." Readers applied the macro rules at several levels of activity in order to identify text main ideas or macropropositions. Ultimately, one "global" level macroproposition summarized text message. Typically readers only recalled 10 to 25% of text propositions on an immediate recall task (van Dijk, 1995). Due to the "levels effect," readers recalled high-level propositions better than low-level ones (Kintsch & Keenan, 1973; Kintsch, 1974; Meyer, 1975). However E. Kintsch (1990) found that while good readers recalled main ideas or macropropositions, poor readers did not and often recalled micropropositions or supporting details of text instead, leading to difficulty in interpreting the author's message.

Model of the Situation. The second level of reader mental representation of the text, Kintsch (1988) termed the "*model of the situation.*" Having recalled propositions from text along with a loose network of associated knowledge, the reader situated this information within the bigger picture of what he already knew. The model of the situation was constructed from the reader's world knowledge, the textbase propositions he had retained, as well as his intentions and beliefs, and represented how the reader interpreted the text. A reader's model of the situation was constrained by the reader's textbase memory but was more responsive to his goals than textbase

memory. Textbase memory provided some building blocks of the model, which were further cycled and integrated within higher levels of associated, conceptual memory. Reader textbase memory was data-driven, but the model of the situation was reader-driven, although the reader could only "situate" or interpret text information that was available to him. Ambiguity or incongruent information revealed by this process challenged the reader's understanding, forcing him to reassess what he knew and what the text told him in order to hypothesize new meaning. The reader's new version of the text message, or conceptualizations about meaning could later be confirmed or negated based on further information.

Kintsch (1988) described the model of the situation as an episodic memory that was individual and flexible. Reader models could be expected to vary due many factors including individual reader ability and text structure. For example, with some texts, the situational model could be procedural (Perrig & Kintsch, 1985), or abstract like the mental model of Johnson-Laird (1983) or employ either linear, spatial or propositional code depending on the nature of the task (van Dijk & Kintsch,1983). Van Dijk (1995) proposed that the situational model was developed to account for how readers create coherence by co-referencing text with prior knowledge of the world and was flexible in response to the need to create a "bridge between social knowledge and semantic representations of text" (p. 397). The construction processes of the model were loosely defined to allow for considerable individual variation in interpretation of text.

Perrig and Kintsch (1985) found that a reader's emotional response to a text topic influenced his performance. Negative affective response to text usually lowered the reader's performance and positive response usually improved performance. Readers with a strong personal viewpoint brought bias to the reading task that could have a positive or negative effect. Authors may deliberately write with the intention of eliciting an affective response perhaps because they have a particular goal, or strong viewpoint, for example to persuade, challenge or amuse the reader. Readers may be unable to override their emotional response and maintain an objective stance in understanding the text content, which in turn can influence their performance. Also readers themselves may also have special interest in, or bias toward a text topic and this can

influence their performance positively or negatively. For example an interested reader with a positive response to text, may put forth more effort to understand text message than a disinterested reader with a negative reaction to text. Reader response to the reading task itself can help or hinder reading performance.

Garner, Gillingham and White (1989) found that factors such as seductive details in text caused the reader to react emotionally, which may have been the author's intention. However they suggested that a major problem in identifying the effect of interest, affect, or bias on performance was reliance on reader self-report. Readers who are inhibited in revealing personal feelings may minimize text influence and others may exaggerate reality. They proposed that it was difficult to measure the effect of reader response to text on reading performance.

The family milieu can also influence reading development. Morawski (1995) found evidence that the reader's early recollections of reading and their reading performance in later life were linked. Those with positive early experiences attained were skilled readers. Those with negative early experiences had difficulty acquiring reading skill. Morawski (1992) also found that reader psychological position within the family constellation influenced reading development. Those who held an important role within the family tended to develop better reading skills than those who held a less powerful role. Effective readers had positive early recollections and felt they occupied an important role within their family. Poor readers had negative early recollections and felt unimportant within their family. Compensated readers may have characteristics of both good and poor readers. They may have had mixed positive and negative early experiences related to reading and held important or unimportant roles within their family constellation. Whatever their background, these readers must have had some positive experiences or overcome any negative ones, in order to succeed in becoming skilled readers.

Affective reaction to the reading task influenced reading performance, for example many LD readers are anxious about a reading task that has time constraints, as they tended to read slowly (Bruck, 1998). Williams (1990) found that reading had an emotional component for many LD readers who missed the main point of text because anxiety, intrusion of personal viewpoints and inappropriate use of prior knowledge. Vespi and Yewchuk (1992) found gifted

LD students had an "emotional overlay" in academic tasks such as reading that led to strong fear of failure. Despite a positive attitude toward reading, they had unrealistically high expectations and overconfidence in their own ability to comprehend text that often led to misunderstanding the main idea of text.

Mental Model Framework of Reading Ability. Denhière, Baudet and Verstiggel (1990) and Royer, Cisero and Carlo (1993) proposed that a mental model framework of reading like that of Kintsch (1988) provided a dynamic picture of how individual readers interacted with text, by revealing both the cognitive processes and mental model product of reading activity. Royer et al (1993) suggested this frame can uncover the efficiency of individual reading ability along qualitative dimensions such as knowledge organization and structure, depth of problem representation, quality of mental models, efficiency of metacognitive learning strategies through exploration of reader verbal protocols. Denhière, Baudet and Verstiggel (1990) proposed three points at which individual ability could be assessed, including text input, working memory process and reader output. That is, dimensions of reader, task and text, including time allowed, text propositional structure, reader prior knowledge and construction skills in transforming text information into knowledge, could be examined in understanding individual reading ability, They suggested that Kintsch's (1988) cognitive-linguistic frame of reading was a means of tapping both what readers took out of text and how they used this information.

McNamara, Miller and Bransford (1994) postulated that a mental model framework of reading can be used to examine individual reading ability and proposed three qualitative dimensions along which reader ability could be examined. Firstly, individual ability could relate to the number and kind of inferences individuals used in constructing a model of the situation. Secondly, it could relate to the reader's ability to integrate different kinds of knowledge, such as spatial information or analogies and thirdly, to automatic or strategic processing by readers. They suggested that good readers "change gears" or switch processes depending on the reading task, but poor readers did not monitor their use of inference and over-relied on prior knowledge, often failing to notice an important commonsense or illogical inference. Skilled reading performance can be assessed using the qualitative dimensions of readers' specificity of

inferences, integration of knowledge and strategic or automatic processing.

Oakhill and Garnham (1988) proposed a cognitive framework of skilled reading within which both the processes used by readers to construct meaning and a mental representation of this process, or "mental model" can be revealed. They found that skilled readers used four cognitive skills to comprehend text:

1. Readers derived the macrostructure of text through a search for the main and supporting ideas and understanding text logical structure.
2. Reader made inferences from text by integrating and adding information from text could be examined in understanding individual reading ability, prior knowledge and using inferences appropriately.
3. Readers used metacognitive strategies to gather more information and monitor understanding.
4. Readers were aware of having a goal or purpose for reading.

As well, resources that readers brought to the task, including prior knowledge, interest and metacognition, or reader self-awareness, also had a strong effect on reading outcomes. Readers with high prior knowledge and interest were motivated to use their cognitive reading abilities. Readers with metacognitive ability were able to detect when they misunderstood text and initiated repair strategies. Skilled readers used both their reading skills and resources to comprehend text.

Ehrlich (1996) found skilled comprehenders had strong decoding skills and read every word in text. They did not predict meaning or skip redundancies. Top-down processes such as inference, were only used to aid word recognition when bottom-up decoding broke down. Compensated readers are also skilled at comprehending text. Their cognitive abilities and knowledge resources enable them to effectively construct meaning and to close any gaps in comprehension.

Reader Resources. Prior knowledge was a major component of efficient reading (Kletzien, 1991; Afflerbach, 1990; Oakhill & Garnham, 1988; Moravcsik & Kintsch, 1993). Readers with strong prior knowledge coded information more quickly in short term memory for

retrieval compared to those without, because they had access to rich yet concise memory networks of associated information (Afflerbach, 1990). They had richer mental representations of text, recognized complex patterns of ideas more quickly, had more flexible problem solving ability and imposed top-down meaning to overcome ambiguity, than those with weak prior knowledge. Those with expertise looked longer at a problem, but solved it faster than those without. They had greater contextual awareness, such as of task and social constraints. They used less cognitive resource because they processed automatically and regulated their own performance (Berliner, 1994). Successful university readers relied on strong prior knowledge to make sense of adult-level texts (Wilding & Valentine, 1996). Ericsson and Kintsch (1991) proposed that readers with strong prior knowledge had an increased memory capacity or "extended working memory" that encompassed part of long-term memory. With an increased capacity, readers were better able to retain text main ideas (or macropropositions) and to infer meaning from what they already knew. Readers with low prior knowledge used available cognitive resource to comprehend unfamiliar words and remember explicit ideas in the text, but had difficulty understanding more subtle, implicit or complex ideas in text.

Stanovich (1988) found poor readers used prior knowledge when word-level processes broke down to preserve on-line coherence. In his above interactive-compensatory model (Stanovich, 1980), prior knowledge helped LD readers to compensate for difficulties. Good readers on the other hand, read every word in text and used decoding abilities, not prediction from prior knowledge, to make sense of unfamiliar words. Top-down prediction was mainly used to repair global understanding when breakdowns occurred.

Metacognition was also found to be critical to effective reading comprehension (Palinscar & Brown, 1985; Pressly, El-Dinary, Gaskins, Schuder, Bergman, Almasi & Brown, 1992) and helped readers in two ways. Firstly it provided the reader with a higher level of reasoning about meaning (Piaget, 1970a; Flavell, 1985; Case, 1992; Shimamura, 1994; Braten, 1991; Borkowski, 1985; Vygotsky, 1978) and secondly, readers with metacognitive knowledge and skills could control their own comprehension and initiate strategies to aid comprehension of text (Garner, 1987). Kintsch (1994) suggested that control processes, or self-awareness helped

readers to detect gaps in understanding and to repair them using inference, which was a top-down process. Baker (1989) proposed nine metacognitive skills support comprehension, including:

1. Understanding the purpose of reading.
2. Modifying reading strategies for different purposes.
3. Identifying important information in a passage.
4. Recognizing the logical structure of inherent in a passage.
5. Considering how new information relates to what is already known.
6. Attending to syntactic and semantic constraints for example spontaneously correcting errors in the text.
7. Evaluating text for clarity, completeness and consistency.
8. Dealing with failures to understand.
9. Deciding how well the material has been understood.

Skilled readers used these abilities for optimal performance. Metacognition helped readers to achieve higher level interpretation of text (Braten, 1991), which required synthesis and evaluation of text ideas. Lower levels of text interpretation included literal understanding of text message or analysis of explicit text ideas (Bloom, Engelhart, Frost, Hill & Krathwohl, 1956). Metacognition usually developed at adolescence (Case, 1992; Shimamura, 1994). Borkowski (1985) suggested that metacognition and intelligence are closely tied.

Kintsch (1998) identified three factors that are important, in different ways to skilled reading: domain knowledge, language skills and decoding skills. Readers with high domain knowledge tended to understand and remember text better than those with low knowledge. Prior knowledge enhanced word identification, attachment of meaning to words, and provided a "macro-operator" or parsing mechanism, which turned phrases recalled by the reader from text, into propositions. This process helped readers extract the main idea of a text. Good language skills facilitated and poor language skills hindered, reading comprehension. Good decoders read unfamiliar words quickly and used top-down prediction from prior knowledge to aid comprehension. Poor decoders were slow and inefficient at both bottom-up word recognition and top-down prediction of meaning. Knowledge and abilities in one area could help skilled

readers with difficulties in other areas. For example, poor decoders with good language ability were able to identify causal links among text propositions and compensate for reading difficulties. He found however, that it was not enough to have skilled reading abilities, the individual must also use them.

Kintsch (1998) proposed that prior knowledge and metacognition interact in helping readers to make sense of text. In a joint model of metacognition and inference, he attempted to account for the different kinds of inferential reasoning readers used in constructing meaning of text and whether or not the reader was conscious of these processes. Based on Guthke (1991), Kintsch categorized inference as either adding or deleting information and also as being under reader conscious control (controlled processes) or not (automatic processes). Readers who controlled their inference process were aware of inferring meaning from what they already knew. Those with automatic inferential process were not and could automatically add or delete inferred information while reading, or if they had a goal in reading, they consciously add or delete information. The latter was like reasoning about meaning.

When the reader had conscious control of his own understanding, he was able to detect inconsistencies, to consider what he already knew and to close gaps in understanding with inferred information. He could also add information by deliberately finding bridging information from what he already knew and by generating inferences that had a logical relationship to text. Information could be deliberately removed by extracting the main idea and generalizing unfamiliar ideas, by applying the macro-rules. This process could also be automatic. Readers could add to meaning construction by retrieving bridging inferences and associative elaborations from long-term memory automatically. Or, if the text was familiar, he could add new information by generating new inferences. Old information could be removed through application of the macro-rules of deletion and generalization. Inference had a powerful effect on individual reading performance in providing new building blocks for the mental model, or removing ones that had been negated. Through careful adding and deleting of information, and application of Kintsch's (1988) macro-rules, the reader was able to extract the main ideas of text and recall the text message. This process could be automatic or readers could consciously monitor this process in

order to ensure its effectiveness (Kintsch, 1998).

McKoon and Ratcliffe (1995) disputed that inference from the reader's prior knowledge played a strong role in reading and proposed a "minimalist" view instead. They postulated that readers only used inference from easily available information to maintain local coherence, unless they had adopted a special goal or specific strategy prior to reading. Perfetti (1989) proposed that there were two levels of comprehension of text and that inference had a different effect on each. At the first level of comprehension readers recalled the message of the text and this activity was text-driven with little inference. At the second level readers used inference from what they already knew to construct their own interpretation of the text and comprehension was reader-driven although derived from text. Perfetti suggested reader interpretation benefited most from rich inferential reasoning about meaning. Also, a reader could use inference to overcome any first level difficulties.

All of the above reading models can be used to frame individual reading ability and compensated LD reading. On-line reading can be represented by top-down, bottom-up and interactive processing. Kintsch (1988) cognitive model provided qualitative as well as quantitative information about the process and product of reader performance. A Kintsch propositional framework can be used with any everyday text. Readers can overcome textbase memory difficulty by using inference and metacognition (Kintsch, 1998) to close gaps in understanding or delete irrelevant ideas, leading to effective interpretation of text.

Skilled reader resources included prior knowledge from which readers infer meaning, metacognition and reading strategies that help readers to improve their understanding of text and the influence of affect, interest, or bias related to reading of text. While much research has been carried out on prior knowledge and metacognition in reading, less is known about the effect of reader emotional factors on reading performance. Resources can help skilled readers to overcome any difficulties in comprehending text. Compensated readers who have skilled reading ability could use such resources to compensate for word level problems. Skilled readers may be conscious of overcoming difficulties. Further investigation is needed.

Critical Summary and Conceptual Framework

The Stanovich Model. Stanovich's (1980) model provides a broad outline of how LD readers compensate for lexical access problems by using top-down prediction and context effects. Contrary to Goodman's (1967) proposal that good readers use top-down processes to comprehend text, Stanovich (1980) found that it was LD readers who used top-down processes to compensate for word level difficulties. Good readers used bottom-up word recognition skills to understand text and only used top-down process when their understanding broke down. Frith (1985) hypothesized that LD readers can become good readers over time by developing effective bottom-up and top-down orthographic reading skills to compensate for phonological disability. The Stanovich model could explain how compensated adult LD readers overcome their persistent difficulties and become good readers. But there are drawbacks to using the Stanovich model this way.

Firstly, the model originated in LD research, which is oriented toward identification of deficits in young reader performance rather than the identification of strengths in compensated reading. It is a model of poor reading by children, not of skilled reading by LD adults. Stanovich suggested that good readers used context to monitor comprehension and poor LD readers used it to aid word recognition, but compensated LD adults could use context for both word level and text level comprehension. In this way top-down processes could aid their development of skilled reading ability and of compensation for their phonological problems. Stanovich (1980) proposed that good readers have sophisticated comprehension strategies and poor readers do not. But compensated LD readers must have acquired sophisticated strategies, despite having word level disability, and could have the characteristics of both Stanovich's good and poor readers.

Secondly, and most importantly, variables in Stanovich's theoretical model have not been operationalized into instruments that could be used to explore compensated reading. On the contrary, the author of the present research that the Kintsch (1988) model of reading comprehension, enhanced by the Stanovich (1980) approach, could advantageously meet this objective.

The Kintsch Model. Kintsch's (1988) model of reading comprehension encompassed and expanded upon other models of reading comprehension. His model accounts for both the reader's productions and the effect of the linguistic structure of text upon those productions. In this way it is an original contribution to the field of reading comprehension. The model provides a framework of reading that is both specific in revealing what a reader takes from text to construct meaning, and flexible in capturing the dynamic of reader interactions with text. Royer, Cisero and Carlo (1989) and Denhière, Baudet and Verstiggel (1990) suggested that Kintsch provided a qualitative framework of individual reading ability that can be used to uncover the processes and products of reader activity. They proposed that the Kintsch framework could be useful in describing how readers construct meaning and providing information about reader strengths and weaknesses. Kintsch can display what propositions compensated readers remember from text and whether or not they recall the main ideas of the text, as well as how they interpret this information and construct meaning. Kintsch provides a qualitative framework within which to examine individual reading ability, and that can include compensated reading ability.

One strength of Kintsch's model is that the role of text in reading performance can be examined. Other models of reader performance focus on reader productions and ignore this important factor. As well, using the Kintsch frame, the reading task can be any text, including the kind of texts adult LD would encounter in their everyday lives. Kintsch's semantic analysis system, like Meyer's idea unit system (1975), is flexible and can be applied to valid tasks of adult reading, providing a more authentic reading task.

Another strength of the Kintsch model is the model of the situation. Individual readers bring varied resources to the task including background knowledge, interest, bias and reading skills. These resources can influence their performance. Reader ability relates as much to the resources a reader brings to the task, as to their reading skills. Also, the reader's goals and intentions for reading may influence his meaning construction process. Kintsch's model of the situation accounts for the variability of individual reader resources and reading skill, including those of compensated readers. There are some limitations in using the Kintsch model to frame compensated reading.

Firstly, Kintsch is a model of reader memory product rather than of meaning construction process. The reader's textbase memory and model of the situation represent the outcome of the reader process, but the processes underpinning mental model construction need to be elaborated. The Kintsch model reveals the reader's ability to comprehend a text, but it does not account for construction or compensation processes. Kintsch proposed that readers used prior knowledge to enrich their construction of meaning through a spreading activation of association within long-term memory. He suggested that this was a cognitive activity in which readers could use problem solving strategies to repair gaps in their understanding. But Kintsch did not specify what kind of cognitive process support meaning construction. This is a major weakness of the model. Kintsch (1994) attempted to address this problem by proposing a reader control amendment to the model, which included both inference and metacognition components. He purported that readers used inference to add or delete information from their construction of meaning and that they could do this automatically or be aware of doing so. He did not explain how the amendment was to be integrated in his model or what were the effects of inference and reader awareness on meaning construction. The amendment is useful in accounting for the cognitive processes readers use to construct mental models, but the amendment needs to be integrated with the model.

Secondly, the role of reader awareness or, to use Garner's (1987) term, reader "metacognition," requires greater elaboration within the Kintsch model. There are two aspects of metacognition that can influence reader performance (Garner, 1987; Oakhill and Garnham, 1988). One relates to a reader's awareness of his own comprehension and the other to the strategies he knows he can use to improve his understanding. As the literature suggests, the influence of metacognition on reader performance can be profound. For example, a reader who knows he doesn't understand the main idea of a text, can initiate meaning repair strategies to improve his understanding, such as rereading the text. Conversely, a reader who does not know he has missed the main idea can be unaware that he has completely misunderstood the text message. The influence of metacognition on reading is considerable and it should be included in a model of the process. Kintsch (1994) attempted to address this important aspect of reader performance by suggesting reader's could make inferences automatically or be aware of doing so.

But he did not address reader strategies in meaning construction, nor did he integrate his reader control amendment with his earlier (1988) model.

The Enhanced Kintsch Model. The Kintsch (1988) model provides a means to measure the reading comprehension of any reader through their recall and interpretation of propositions in a text (the main ideas and message of the text). Since LD readers who comprehend a text have effectively compensated for their reading disabilities, the Kintsch model can be used to confirm Stanovich's theory of compensation. To determine how the successful LD readers compensated, the Kintsch Model must be supplemented by questions on their compensation strategies and their awareness of compensating. This Enhanced Kintsch model can be used to operationalize the theoretical compensation model of Stanovich.

In applying the Enhanced Kintsch model, it is necessary to acknowledge the common elements between these models and reconcile their differences. As the models originate in different fields, the terminology varies between them. In the LD field, reading disability has been identified in terms of specific subskill deficiencies and neurological dysfunction. Compensation has been vaguely characterized as "orthography" or top-down process, but it has not been described in terms that can be identified in the everyday reading of LD readers. In the reading research field, readers are characterized by their "good," "skilled" and "poor" reading performance without distinction of any specific disability, cultural disadvantage, school attendance problems, or low overall ability. Neither model accounts for individuals who are both disabled and skilled at reading, but each model has features that can could provide a conceptual framework for exploring compensated reading.

The most important common element between the Stanovich (1980) and Kintsch (1988) models is the role of prior knowledge in reading performance. Stanovich proposed that top-down processing from what the reader already knows about the text facilitates reading comprehension in two ways. Firstly, it can speed word recognition and, secondly, it aids construction of a "knowledge structure" from text. That is, it aided both orthographic word reading and contextual prediction. Skilled readers had "rapid" word recognition skills and "superior" general comprehension strategies. Disabled readers, on the other hand, used top-down "context effects" to form "conscious expectancies" about the meaning of words and compensate for their slow and

inaccurate word recognition skills. Skilled readers used top-down, context effects to monitor their comprehension of text while disabled readers used it to aid word recognition. Compensated LD readers can use their prior knowledge to both aid word comprehension and gain a more global text comprehension. With strong orthographic skills, the reader can recognize words in a text accurately and, with superior comprehension ability, understand the global meaning of text. As Stanovich suggested, deficiency in one knowledge source can be made up by knowledge from another source. In this way, a reader can compensate for difficulties.

Kintsch (1988) also outlines a strong role for prior knowledge in reading. He proposed that knowledge acts as a constraint on the reader's mental model construction, particularly at the integration phase. Knowledge of concepts and propositions has a top-down effect on reader comprehension through "expectation-driven" processes and provides a "filter" through which the reader can interpret text. Kintsch proposes that there are three levels at which knowledge influences reader process. At the lower level knowledge aids word recognition and parsing. At the middle level it aids semantic and syntactic processing of sentences and at the highest level, it constrains inference from the reader's scripts, frames and schemata in long-term memory. Knowledge makes reader processes "smart" so that the reader can evaluate whether propositions are relevant or irrelevant to overall global meaning of text as they construct meaning. But Kintsch (1988) provides a model of text rather than of word reading and, unlike Stanovich, cannot account for lexical access, word-level problems of disabled readers. This is a strength because Kintsch provides a framework of text reading that can be used with everyday texts that have validity as measures of adult reading.

Another common element of Stanovich and Kintsch is that they provide a multi-dimensional framework of reading at different levels of process and mental representation. The dynamic interactions between reader and text may vary over different tasks and different readers. Kintsch can account for different texts and individual readers, while Stanovich frames compensated reading. In Stanovich, reading is an interactive, dual-level activity, whereas in Kintsch, reading is represented internally by a dual-level mental model. Together these dimensions provide a rich framework within which to examine variability between readers in how remember and interpret text, and what processes they use to do so. This qualitative

framework of individual reading ability can be used to examine the processes and mental model products of reading activity. In the Enhanced Kintsch model, the reader's mental model can reveal any difficulties the reader experiences and his model construction processes and strategies can reveal what mechanisms he used to overcome these problems. In the Stanovich (1980) model, readers change levels of process when a deficit in any level of text processing results in "greater reliance on other knowledge sources" (page 32). Readers may be conscious of the need to change levels, and processing at the new level may demand different cognitive resources of the reader. Readers can avoid a breakdown by switching their levels of process. Similarly, in the Kintsch (1988) model, readers can overcome gaps by generating hypotheses about meaning from their own prior knowledge that are situation specific and context dependent. This activity enables the reader to make bridging inferences and use macro-level process to overcome micro-level difficulties. Kintsch (1994) suggested that readers may consciously or automatically use inference and metacognition to close gaps in understanding.

Together, the Stanovich and Kintsch models provide a broad, qualitative framework for the exploration of the individual process and product of reading. While the Enhanced Kintsch model is strong for measuring compensated reading, it is weak about how readers close gaps in understanding due to text coherence problems, unfamiliar text topics, or other reading disability. Kintsch suggests overcoming gaps is a "problem solving" activity that is important to "learning from text" (Kintsch, 1994). Readers read challenging text more effectively than they do unchallenging text because they have to work harder to comprehend it. It could be that compensated readers who like challenge, can use problem solving strategies to overcome difficulties, motivated by the challenge of the text. Kintsch, however, does not specify the nature and function of the processes underpinning these cognitive repair mechanisms and this ambiguity is a weakness of the model. Stanovich's top-down processing is also vague. Although he suggests that top-down processes aid word recognition and comprehension, Stanovich does not specify what these top-down processes are. Some of the top-down processes identified in the literature that could underpin word recognition and comprehension include inference, reader awareness and strategic activity. Greater elaboration is needed about the nature and function of top-down processes in order to understand the strengths of compensated readers. In short, the

mechanisms readers use to close gaps in understanding are vague and need to be elaborated in both contributing models. The interim solution is to include questions on compensation strategies and metacognition that contribute to the Enhanced Kintsch model.

Reconciliation is needed between what Kintsch terms a "proposition," which represents ideas in text and not necessarily words, and what Stanovich terms "words" in text as the object of reader attention. In Kintsch's frame, a proposition is part of a hierarchy of idea units that represents the author's message. Higher level ideas, which represent the main ideas of a text, are more important than lower level ones. To remember the author's message, the reader must recall the main ideas from the macrostructure of text, while it is not necessary to remember lower level ideas or micropropositions. The main ideas are important to the reader in comprehending text, not the words in the text. To comprehend text in Stanovich's frame, the individual reads every word in text and constructs a "knowledge structure" from this activity. Skilled readers are found to read every word, as do Stanovich's disabled readers. The meaning readers assign the word in memory may differ from the actual word in the text, but this aspect of comprehension is not fully explored in Stanovich. Although Kintsch's proposition of ideas and Stanovich's words differ, they both are input information that the reader uses to construct his own comprehension of text. The nature of the information is less important than what he does with it. Shades of differences in meaning between both can be reconciled in order to address the overarching question of what the compensated reader does with this information that results in a successful outcome.

Another aspect of the models that must be reconciled is that Kintsch distinguishes between reader recall and interpretation of text and Stanovich does not. Stanovich's theoretical model is designed to explain findings in LD and reading literature; it is not a tool for empirical study. Kintsch, on the other hand, has been used extensively in the study of on-line meaning construction and individual reading performance. The Stanovich model could be addressed by the textbase construction part of the Kintsch model to show that compensated readers change from low-level word recognition to high-level context effects to overcome gaps in recalling the text message. This compensatory mechanism enables the reader to maintain speed and accuracy in reading words and remembering ideas in text. Stanovich's top-down process could also be sought in the construction of the model of the situation. Compensated readers can add or take

away building blocks of the model to improve their interpretation of the text. This difference between the models can be reconciled by using Kintsch's focus on comprehension to support Stanovich's focus on compensation.

Within the Enhanced Kintsch model, the reader uses bottom-up and top-down processes interactively to access not only words, as in Stanovich, but the surface textbase and propositional elements from the semantic structure of the text. The reader integrates the propositions he recalls from the text with his prior knowledge to create his textbase memory. If he encounters any gaps or conflicts in understanding, he initiates another search for linkage within the network of association that the recalled propositions have created in the working memory. This repeated searching for linkage leads to strengthening what he evaluates as important and forgetting what is determined to be irrelevant. He uses top-down processes to recognize words (and remember propositions) and comprehend the meaning of these words, or formulate "conscious expectancies." If the compensated reader fails to find connection within Kintsch's associative network, his top-down process helps him to seek the bigger picture of what the text is about. In reflecting about his interpretation of text, the reader transforms text information within his knowledge of the world and creates his model of the situation. Stanovich's "context effects" or "sophisticated" comprehension strategies can again help the compensated reader to close gaps in understanding, import new or delete old, information.

Both models have shortcomings in providing a conceptual framework for the study of compensated reading processes and strategies. Neither may be the kind of orthographic skill that Frith (1985) and others described as underpinning compensated reading development, although there are some similarities between orthography and the higher level process of both models. In the Kintsch model, the higher level process took several forms, including reconstruction of text macrostructure within the reader's textbase memory through the hierarchical ordering of ideas in text within reader memory. Higher processes also helped readers to consciously or unconsciously make inferences that added or deleted information from their mental model construction process. In the Stanovich model, top-down processes, which are similar to Kintsch's macrostructure construction and inferential processes, strengthened reader word recognition in text. Readers used what was available to them to compensate for "deficit in any

particular process that will result in greater reliance on other knowledge sources, regardless of their level in the processing hierarchy" (page 32). Top-down inferences or expectancies helped readers improve their global comprehension of the text message and strengthen their ability to understand and recognise words in text:

> Intraword redundancy (which) arises because of the sequential and position-specific constraints on the letters within words. Thus, written language is orthographically structured. The ability to use orthographic structure to speed word recognition is closely related to reading ability. (Stanovich, 1980; page 37)

Elements of reader processes in both models could relate to reader use of orthographic skill. In Stanovich (1980) both "orthographic effect" and "context effect" aided LD readers to compensate for decoding problems. In Kintsch, gaps in textbase memory were overcome by recycling of retained propositions within the network of reader association, strengthening ideas from text and creating new conceptualizations of meaning. Reader control (Kintsch, 1994) and to be aware of doing so, also helped readers to close gaps in understanding. These resources from both models appear to be close to the heart of the compensated reader process and may represent Frith's orthographic skill.

Another shortcoming is that neither model fully accounts for reader awareness of his own reading and use of reading strategies to improve his understanding. In both the reading and LD literature, metacognition is critical to both LD compensation and skilled reading. Metacognition is an integral part of skilled reading (Baker, 1989) and aids readers in planning a goal for reading, monitoring and evaluating their own performance, detecting inconsistencies or gaps in understanding and in identifying bias (Baker, 1989; Swanson, 1993; and Garner, 1987). A model of LD compensation in reading must include a metacognitive component. Kintsch (1994) suggests that readers can control their own use of inference to elaborate meaning, bridge gaps in understanding and generate new ideas. But his use of the term "reader control" appears to be one aspect of metacognition, as the term is used in the LD and reading literatures. He does not account for the reader consciously setting a goal in reading and evaluating his own performance,

nor for the use of strategies such as rereading to consciously improve understanding.

Stanovich (1980) was designed to model how disabled readers compensated for phonological problems, not how able LD readers overcame these problems and achieved success. It did not include a metacognition component. In the last decade, metacognition and reader control have been found to be integral to LD compensation and success (Adelman and Vogel, 1990: Weller, Watteyne, Herbert and Crelly, 1994: Gerber and Reiff, 1994: Kerschner, Kirkpatrick and McLaren, 1995). Highly successful LD had very strong control of themselves and their own process, which "buffered" them against failure in their adult work environments. Control was characterized as internal decisions such as goal setting and monitoring, and external activity that reflected the internal decisions such as strategic behaviours, assimilation of new challenges and persistence. Stanovich and Cunningham (1991) found readers used strategies to think about meaning but this has not been merged with Stanovich's (1980) model. Kintsch only partially accounts for reader control in inferencing in his (1994) amendment. A metacognitive component must be added to the Enhanced Kintsch model if it is to account for this important aspect of LD compensation.

Issues in Reading Process of Compensated Readers. There is much theoretical discussion about LD compensation in the literature and some empirical evidence of individuals attaining reading competence despite persistent subskill problems. Yet, little is known about how compensated readers overcome their disability in reading and what strategies they use to do so. A major difficulty in acquiring this information is the lack of an appropriate framework within which to explore compensated reading. Currently standardized instruments are used to ascertain that compensated readers have successfully attained reading competence. These tools aim to assess the product of reader performance but do not reveal how the individual achieved this outcome. Non-words on the other hand, are used to uncover reader weakness, but reveal nothing of reader strengths. Neither tool can uncover the compensatory processes and strategies compensated readers use to read successfully in their everyday lives. An Enhanced Kintsch model offers a qualitative approach to the study of compensated reader and a greater potential of pertinent information.

Leong (1999) found, the literature on adult LD reading was "relatively small," current research standards were low. Terms used in studies were often loosely defined and varied considerably among researchers. LD reading tasks were often poorly described or unstated, for example often only a small excerpt of text was given. These tasks also had poor validity as a measure of everyday reading ability, for example nonsense syllables or words were used to confirm phonological deficits in competent LD readers. Study methodologies were often vaguely stated and difficult to replicate. Leong proposed that more rigorous standards in use of terminology, description of methodology, task validity and other research parameters must be upheld to provide accurate and practical information to interventionists.

Another issue in the literature is the lack of information about LD success. Currently, much more is known about the negative aspects of LD and problems of young LD readers, than about positive outcomes and the strengths of adult LD readers, and there is little longitudinal data. Rawson (1968) conducted a longitudinal study of males in a private school who were from wealthy backgrounds and later became successful professionals. But there were only a small number of subjects in this study. All were male and came from privileged backgrounds. They were not representative of the general LD population. Bruck (1992) retested LD adults she had originally identified and assessed as children in her clinic. She affirmed that these individuals had persistent difficulties despite their reading competency.

Many LD adults are not successful in life and develop aberrant behaviours such as criminal activity or drug addiction (Greenbaum, Graham and Scales, 1996), but others compensate for their disability and cope with everyday life. Recent research initiatives, including surveys of LD university student characteristics and case-studies of highly successful LD individuals, have attempted to address this issue, but these are few in number and narrow in scope. Also, recent initiatives attempt to identify common characteristics and generalized compensatory mechanisms. They do not provide practical information about successful compensation in everyday tasks, which could be used to help others. Case studies usually describe past difficulties, identify current reading ability, confirm persistent deficits and include self-reported compensatory strategies (Kershner, Kirkpatrick and McLaren, 1995; Howard and Best, 1997). They do not provide the kind of task-specific information that could be used by

interventionists. More exploration is needed about how compensated readers overcome their disability on-task and what strategies they use to do so. This information can be used by interventionists. Until recently there has been a lack of acceptance of LD ability by society in general, as well as university graduate and professional schools (Ganschow, Coyne, Parks & Antonoff, 1999). It is very difficult to succeed in life with an identified learning disability. To change this situation, more information about LD success and compensation is needed to raise awareness about the potential strengths of LD.

Another issue was the difficulty in generalizing findings from existing comparative and quantitative studies of LD reading. The LD population is heterogeneous and although most researchers identified phonological disability as the deficit that underpinned reading disability, much variation in the severity and specificity of impairment existed among individuals. Case study methodology seems to be a more appropriate experimental design in providing in-depth information about individuals. Current comparative and quantitative frameworks of reading ability do not provide this type of information.

There is much information in literature about skilled reading, but none about skilled LD reading. Perhaps there are some similarities between both. The resources that helped skilled readers to comprehend text may help compensated readers to do so also and may help them to overcome the effects of their disability. Resources identified in the literature included prior domain and procedural knowledge of task demands, reader goal (McNamara, Miller & Bransford, 1991), speed and accuracy of word recognition or lexical access (Stanovich & Cunningham, 1991), metacognition (Garner, 1987) affect (Perrig & Kintsch, 1987; Morawski, 1992) and reader flexibility to respond to text structure by change in processing (Kintsch, 1994). However one weakness of these findings was that they were usually self-reported and not confirmed. Readers may not read as they think they do. Study of the effect of self-reported resources on reading process is needed to find and verify the accuracy of what resources compensated readers think they use to read successfully and overcome any problems.

The Enhanced Kintsch model can be used to uncover the compensated reader's reading processes and mental model products. Reader metacognitive knowledge and strategies can also be examined by identifying the strategies readers use to comprehend text and ascertaining their

awareness of this activity. By discovering how compensated readers succeed in comprehending text, what strategies they use to do so and whether they are aware of compensating, the strengths of these individuals can be revealed and new information about compensation provided to interventionists.

In view of the above discussion, the following research questions will guide the exploratory case study:

Research Question 1. How do compensated readers overcome textbase difficulties?

Research Question 2. Are compensated readers aware of compensating?

CHAPTER 3
METHODOLOGY

Researchers in the field of disabled and skilled adult reading have examined several research instruments and their corresponding research methodologies. According to the review of the literature on compensatory LD reading, these methodologies are few in number.

Researchers have used non-word reading tasks to test the phonological reading skills of compensated readers and to ascertain that they have a persistent phonological deficit. Standardized tests of reading achievement have also been used.

Non-word reading tasks. Non-word reading tasks were commonly used by researchers, including Bruck (1998), Snowling (1987) and Stemmer and Whitaker (1998), to test phonological reading skills. Non-words or nonsense words were composed of phonemic units of language that had no known meaning in the target language, such as "grint" or "slemp." They were used to negate the strong effect of contextual processing found in regular words and logographic or morphological reading skills. This task was widely used in reading and neuropsychological literature as a test of persistent phonological deficits in adult readers, whom otherwise have competent reading skills. Regular reading tests did not reveal this underlying problem. For example Richardson and Dibenedetto (1985) developed The Decoding Skills Test (DST) as a standardized test of non-word reading to test the phonological decoding abilities of grade school children suspected of having dyslexia or phonological reading disability. Tests like the DST were used by clinicians to isolate the reader's phonological processing ability in order to ascertain the existence of deficits, or not. Non-word tasks were specifically designed to tap reader deficits and so did not reveal much information about the abilities or compensations of disabled readers.

Standardized achievement tests. Standardized achievement tests represent the most common method of ascertaining adult reading abilities. Amongst these tests, one finds the Woodcock-Johnson Achievement Battery of tests (1993) and the Wide Range Achievement Test-Revised (1984). These tests do not reflect the objectives of the present research, which is seeking information about the reading process of the adult compensated reader population. In

addition, a major difficulty involves the test items, which were based on sentences or passages in isolation - a task unlike everyday reading. Another difficulty arose with the timing procedures associated with these tests, which place the LD reader at a disadvantage (Adelman & Vogel, 1998). But to use the test without timing may be invalid for NLD readers. One very rapidly reaches the conclusion that another venue needs to be identified.

Current Methodology for Studying Compensated Reading

One solution to the problem of finding a methodology for the study of compensated reading is to borrow a tool that has been used extensively in the field of cognitive science: verbal protocols. Pressly and Afflerbach (1995) found this tool to be highly effective in describing the comprehension processes. Verbal protocols have been used extensively by researchers to uncover the underlying thinking processes of individual on-task performance. Reading achievement tests provide information only about the product of reader performance. Non-words provide information only about reader deficits. But verbal protocols provide information about the reader's achievement as well as the process used to attain that achievement. In this way verbal protocols can be used to uncover compensated readers' on-line performance and the processes by which he overcame his difficulties.

Verbal Protocols. Ericsson and Simon (1993) provided a seminal theoretical framework for the generation of verbal reports that has been used extensively in the study of problem solving and reading comprehension. It was developed as a means of examining individual performance within the information-processing model of human cognition (Klahr, 1978). It was applied as a learning tool to help learners become more self-aware of their processing, and as a diagnostic tool (Royer, Cisero and Carlo, 1991) in assessing individual ability.

Ericsson and Simon (1993) proposed a model of verbal report methodology that enabled researchers to interpret cognitive processing in a simple, yet "robust" (p 10) manner. Within this model, subjects are given a problem to solve and asked to think aloud as they seek a solution. To do so, they must understand the task at hand and be able to encode it into memory cues for the retrieval of relevant long-term memory information. The individual must also sequence this

information into coherent verbalizations. The following assumptions are made within Ericsson and Simon's model (1993):

1. A cognitive process can be seen as a sequence of internal states successively transformed by a series of information processes.
2. Information is stored in several memories having different capacities and different assessing characteristics, including several sensory stores of short duration, a short-term memory with limited capacity of intermediate duration and a long-term memory with a relatively large capacity and permanent storage, which has slow access and fixation times compared to sensory and short-term memory.
3. Information recently acquired, attended to or heeded by the central processor is held in short-term memory and is directly accessible for further processing. Information must be first retrieved from long-term into short-term memory before it can be reported.
4. Any verbal report of cognitive processes would have to be based on a subset of information held in short or long-term memory. (pp. 11- 12)

Retrospective debrief and think-aloud or concurrent verbal protocols were two widely accepted methods of collecting information about the contents of the mind. Ericsson and Simon (1993) suggested these forms of data collection most closely reflected subjects' cognitive processes. In immediate retrospective reporting, the contents of subjects' short-term memory, containing a durable memory trace of information heeded while completing the task, could be directly accessed through an immediate verbal or written report. In concurrent reporting, subjects talked aloud about the task they performed and in so doing described successive states of retained information.

Criticism of this methodology included claims that instructions given to subjects before recording of verbal reports may change the subject's performance and cognitive processing (Gagné and Smith, 1962). The observed behaviour did not always match subjects' verbal responses and some subjects were unable to express thoughts during production (Nisbett and Wilson, 1977). However, Ericsson and Simon (1993) suggested these criticisms were related to poor data collection procedures or requesting information that was difficult to access even if

thoughts could be revealed. Probing for subject awareness through concurrent reports or immediate retrospective reports of specific cognitive processes yielded the most direct evidence and best available insight of subjects' cognitive processing. Even Nisbett and Wilson (1977) concurred that people were able to report the contents of currently activated short-term memory. Siegler (1986a) found verbal reports were widely used in psychological research despite questions about data validity, reliability and bias, because the reports enabled researchers to examine data that would be inaccessible by any other research methodology.

Verbal report methodology has to be applied cautiously. Pressly and Afflerbach (1995) found data can be unreliable when subjects were asked to explain or describe their processing while carrying out a task or give a generalized description of their processing over several tasks. Reports of the final "product" of processing, or an intermediate product, on the other hand could provide useful information. They also suggested that directions to subjects should be open-ended or specific to the type of information required - either provided useful information. Subjects should also be told that honesty and accuracy are important in self-reporting and that subjects should not "censor" their verbalizations. Pressly and Afflerbach (1995) and Ericsson and Simon (1993) suggested that subjects did not require training in verbal reporting although probe questions were sometimes needed to prompt them to respond. Researchers should not try to average over differences in subjects' thinking processes, protocol analysis and coding should always reflect the individual variability found among human thinking.

Pressly and Afflerbach (1995) surveyed use of verbal report methodology in reading research and found that the cognitive processes, which underpinned meaning construction and the reader's mental representation of text message in memory, were difficult to identify using other methodologies. Verbalizing thought processes while reading text did not interfere with reader comprehension processes (Levin and Addis, 1979). Nor did reading aloud or silently change readers' performance although skilled readers read faster silently. In a study of text summarization, Garner (1987) found that debrief accounts immediately following the task matched and confirmed descriptive notes written by the researcher during performance of the task.

Ericsson (1988) purported that verbalizations are greater in reading when task texts

present the reader with a challenge. He found subjects had little to say when the texts were easy to read. For reading disabled subjects in the present study, reading was a challenge and individuals could talk about their understanding of text. Bereiter and Bird (1985: Experiment 1) found verbal protocols revealed the repair strategies used by subjects when challenged by text. They gave adults texts that were approximately 3,000 words long and found subjects relied upon four or five main strategies when challenged by text. These strategies included rephrasing ideas in simpler language, rereading text, identifying missing information and verbalizing questions followed by attempting to solve the comprehension problem.

Different kinds of verbal report data can be used to improve the reliability of subject self-report and think-aloud protocols. For example, the researcher can clear up questions or issues raised in recording data by asking questions during an immediate retrospective debrief or delayed debrief. Taylor (1992) used concurrent verbal protocols and retrospective debriefings in her study of adult experts' and novices' knowledge of their own executive control strategies while solving ill-structured problems. She found the complementary use of both data collection method enhanced the richness, reliability and validity of the data and matched the actions of subjects during the problem solving process. A content analysis of concurrent protocol data showed that it was local and specific in nature and provided detailed reports of the small sequential steps subjects took while solving problems. Retrospective data was of a more global nature and revealed summary of major steps in the problem solving process. Each kind of information complemented the other, providing rich detailed and global analysis of the process. Another advantage of protocol methodology was that Taylor was able to ask the subject after performing the task and during the debrief session, to clarify or elaborate upon anything that was unclear in the concurrent report.

Materials

Selected Texts. Eight passages were extracted from current adult-level materials including "The New York Times", "Scientific American", "National Geographic", the "Globe and Mail." A panel of six adult readers selected two passages of general interest, as suitable for

use in the present study. The two passages can be found in Appendix 1. Passage 1 contains approximately 735 words and Passage 2, 690 words. A Fry's readability analysis was carried out on the two selected passages, both of which yielded scores of Grade 17. A semantic propositional analysis was carried out with a linguistics specialist on each passage, using the Kintsch framework (van Dijk & Kintsch, 1983; Kintsch, 1985; Turner & Greene, 1977) to identify and categorize propositions found in the text. This yielded a propositional structure, known as the template textbase, for each passage found in Appendix 2. Appendix 3 contains the propositional analysis of a sample sentence from each passage. Judge agreement was sought from six independent readers as to what constituted the main and supporting ideas of each passage. Each reader was given a description of what a proposition was from Kintsch (1985) and the difference between a macro and micro proposition. They were asked to identify the main ideas of the texts, which were matched with the actual propositional structure of the textbase. Two readers suggested that some main ideas were more important to the text message than others. The group proposed that there were two levels of macroproposition and that these be termed main ideas and supporting ideas. The main ideas included the main idea of the text. The group agreed after much discussion with the categorization of macropropositions found in the textbase template for each passage (Appendix 2).

Interviews

Each interview was conducted within a one hour session. Prior to agreeing to take part in the study, participants were informed that the interview would be audio-taped and were reminded of this before they began reading the passages. During the interview, subjects were asked a few general questions about their area of specialization and current employment to establish a rapport. The experimental task procedure was explained. Participants were asked to read Passage 1 silently and told to take their time. The researcher asked each subject the following questions orally immediately after he or she had read the passage. The subject's responses were audio-taped:

- Tell me all you remember about this text?

This question is intended to elicit recall of reader text-base memory

- What did you learn from this passage? What did it suggest to you?
  This question is intended to elicit reader model of the situation of text.
- Have you any prior information or interest in this topic?
  This question is intended to elicit the reader's awareness of his own prior knowledge.
- How did you learn from this passage? Is this the same as if you were learning from a textbook?Subjects were then asked to read Passage 2. The researcher then asked the above questions again and the subject's response was audio-taped. After the subject had read both passages and responded to all the above post-task questions, a retrospective debrief interview was conducted. This was also audio-recorded. Participants were asked the following questions:
- Did you find reading these passages hard, easy or moderately difficult? Why? How did you feel when you were reading them?
  This question is intended to elicit reader awareness of process.
- What sort of habits or strategies do you use when you are studying? When you are reading a difficult text, what do you do to make it easier for you?
  This question is intended to elicit information about reader strategies and awareness of use of strategies while reading.
- What is easy for you ?
  This question is intended to elicit reader awareness of his own learning ability.
- Is there anything in terms of reading that you feel we haven't covered?
  This question is intended to enable the participant to provide any extra information he judges to be relevant.
- What emotions do you associate with reading? (Morawski, 1992)
  This question is intended to find out reader affective response to the reading task.
- What motivates you to learn in general? What inspires you?
  This question is intended to enable the participant to identify what motivates him in life.

Population and Sample

The population of the present study is composed of LD readers who have at least two years of successful university study in a degree program and who have been formally identified as learning disabled. Selected subjects were balanced for gender, age and professional specialization. All subjects were successful in both academic study and their professional life. They are representative of compensated readers who have achieved literacy competence despite having a disability. The sample consisted of eight individuals including four males and four females, ranging in age from 23 to 52 years. The professional specialization included two males and two females with science and mathematic expertise, as well as two males and two females with social science or arts specialization. All of the subjects had been formally identified as learning disabled and had volunteered to enter the study on the basis of informed consent with the right to withdraw at any time.

The Pilot Study

A pilot study was conducted (Egan, 1993) with eight LD and eight NLD university students, all of whom had at least two years of successful study in a degree program and had been identified as LD by the university Student Services department. The objective of the pilot study was to find whether Kintsch's semantic propositional framework could be used to differentiate individual LD and NLD reader processes and productions in reading and if it could be used to identify compensatory strategies used by LD adult readers in comprehending text. Participants were balanced for gender, education and age. The following is an overview of the research document.

Three expository passages about approximately 575 words long were used as reading tasks. The topics of the passages were nuclear power, schizophrenia, and budgerigars. The passages were extracted from "The New York Times" by Meyer (1975) and used in her study of the effect of low and high signalling in textual structure on the short-term and long-term recall of text by undergraduate university students. The passages with high signalling were selected as

having explicit expository propositions related to the topic and were accessible to able LD readers. Low signalling passages had looser construction of sentences and ideas, and they contained material irrelevant to the main topic that made them more difficult. Meyer had selected these passages to study university student reading and so they were considered appropriate for students in the pilot study. Meyer's categorization of idea units was adapted to the Kintsch semantic propositional framework in order to create a template textbase for each passage. Idea units that were at the top of Meyer's hierarchy were matched with Kintsch's macropropositions. Ideas low in the hierarchy were matched with Kintsch's micropropositions. Kintsch's terminology was then used to analyze the data and to discuss individual reader and group reading performance.

Readers were each interviewed in a one hour session. Subjects were asked to read Passage 1 aloud and to "think aloud" as they read. They were then asked the following introspective interview questions:

- Tell me as much as you can remember from the passage?
- What are the main and supporting ideas of the passage?
- What is your interpretation of this passage?
- Do you have any recent interest or information in this area?

The above procedure was repeated for Passages 2 and 3. The three introspective interviews were followed by a retrospective or debrief interview, in which subjects were asked the following questions:

- Did you find these passages hard or easy?
- What problems do you have with language?
- How do you study using course-text?
- How do you study using course-text?
- What reading strategies do you use?
- What help should be available to learning disabled students?
- What is easy for you?
- Is there anything in terms of reading that you think we haven't covered?

All subject responses were audio-taped and transcribed verbatim. Audiotapes of each interview

were transcribed and recall of text semantic propositions were identified using the template textbase of each passage. Two levels of macropropositions, global and macro were created within the template. The global idea was the primary idea of each text and the macropropositions were its supporting main ideas. Micropropositions were secondary details of text that related to or elaborated upon the supporting main ideas. Reader interpretation was revealed in the reader situational model. Reading strategies were self-reported by the subjects.

Reader textbase memory revealed in verbal protocols was coded using the template textbase for each passage. Reader models of the situation were coded as either a literal interpretation of the explicit information in the texts or an evaluative interpretation of the text message. An individual profile was drawn up for each participant based on information found in the interview transcription and included information about the reader's performance on each of the 3 reading tasks as well as the debrief interview. Group profiles were also drawn up and similarities and differences determined both among and between groups.

Qualitative and quantitative differences were found between LD and NLD readers in recall of text. NLD students recalled more than twice the global and macrostructure of text than LD students. These results were matched by E. Kintsch's (1990) younger readers. Differences were both quantitative (LD recalled less global/macropropositions than NLD) and qualitative (LD recalled more minor details than did NLD).

For models of the situation there was no difference between groups in interpretation of text. Both groups were able to interpret all three passages at a higher evaluative level, except one LD student who had a strong affective response that prevented her from interpreting the text. Interestingly, readers did not need to recall text macroproposition in order to effectively model the situation of text as Kintsch (1994) suggested. As well, both groups reported similar strategies, such as rereading and highlighting text, although the LD group identified more visual representation strategies than NLD students. Also, LD students identified a greater range of metacognitive reading strategies than NLD and appeared to use them more often than NLD.

The Kintsch framework was found to be useful for uncovering both the process and mental model differences among individuals and among LD/ NLD groups, also reader strategy usage. However, use of comparative group methodology tended to obscure differences between

individuals. Finer-grained analysis was needed of individual LD reader performance. Also, the Meyer passages were out of date and more knowledgeable readers were distracted by this. More recent texts were needed to capture reader interest and elicit more responses. Merging the Kintsch framework with Meyer's frame proved to be difficult. The Kintsch frame alone would have been more useful. Some questions asked during the debrief interview did not yield useful information, for example "What help should be available to learning disabled students?", tended to elicit retelling of negative experiences at university, school and home rather than information about compensation. More time was also needed as one hour was not long enough to establish a rapport with the participant and allow time for response to open-ended questions, such as "What is easy for you?" Concurrent verbalizations did not reveal very much information about individuals, as few said anything while reading. Six LD and two NLD participants instead drew diagrams of text material or shut their eyes, claiming to visualize an image of text. Greater in-depth study of LD individuals and closer exploration of their everyday compensatory strategies might yield more useful information than comparative study of NLD and LD university students.

As a result of the pilot study some alterations were made to the above methodology:

1. It was decided to use case study methodology instead of that of comparative groups. Although group study provided evidence of LD reading, a closer examination was needed to investigate how they compensated for difficulty and what strategies they used. Also, there was considerable variation in performance among LD readers that could not be fully explored within the comparative methodology of the pilot study.
2. The three texts used in the pilot provided redundant data. Two texts like the ones used in the first study would provide nearly the full information.
3. More time was needed to develop a rapport with LD readers, allow them to relax, and complete the reading tasks. LD individuals were anxious carrying out a task that had given them difficulty in the past. Some wanted to drink coffee and chat while reading. Others wanted to find a more comfortable and brightly lit setting. Most interviews lasted more than two hours, and some three hours.
4. Concurrent protocols were discarded. Thinking aloud was minimal during the

pilot study and subjects reported that thinking or reading aloud increased their anxiety, particularly as they were aware of making word pronunciation mistakes.

5. Interview questions were clarified in the current study. For example, questions designed to elicit reader recall response were changed from "Tell me as much as you can remember from the passage?' and "What are the main and supporting ideas of the passage?" into a single question, "Tell me all you remember about this text?" as subjects either repeated the same information, or responded fully to the first and not to the second.

6. In order to access more information about readers' self-regulation and awareness of their own processing, the questions "How do you read?" and " What habits and strategies do you use?" were added to elicit this information on self-regulation and awareness. In the pilot study, LD readers were found to be well aware of their strengths and weaknesses; had this information needed to be tapped.

Current Study Procedure

Subjects were recruited for the present research project through self-referral and the researcher's volunteer activities with an adult LD advocacy group. Although 10 individuals were interviewed, data from two were discarded. One was a female participant who altered the task by writing down words and phrases while reading, to give herself virtually complete recall of text main ideas. The other was a young male, who had family problems and decided to withdraw from the study. All participants had been officially identified as LD at some time during their academic career or at university. Each participant was given an outline of the study and information as required by the Education Faculty's Ethics committee. Each was asked to sign a consent form before participating and told she/he had the right to withdraw at any time.

Data collection took place in either a room on the university campus or the office of the interviewee, at a time convenient to the interviewee and the interviewer. The interview room on campus contained a large table upon which a tape-recorder was set up to record and several comfortable chairs. The room was comfortable, quiet, well lit and well-ventilated. Six interviews

took place during the afternoon and two in the evening. All commented on their nervousness prior to the interview.

The interview began with a general discussion in order to establish a rapport. The participant was asked to read the first text in his own time, indicating to the researcher when he had finished (The convention of using a masculine pronoun to represent individual participants will be adopted for simplicity, although participants were of both genders). Responses to the interview questions were audio-taped when the participant indicated he was ready to speak. The second passage was read under the same conditions. Debrief interview questions were then asked and responses audio-taped. Following the interviews, participants' verbal protocols were transcribed verbatim.

The data was analysed using the Kintsch (1988) framework. Responses were coded within the associated propositional textbase, under the guidance of a linguistics specialist, using the template textbase in Appendix 2. The text macrostructure was identified by application of Kintsch's (1988) macro-rules. Reader prior knowledge was determined to be topic knowledge of the text. Readers were rated as having strong prior knowledge if they had taken a university degree level course in the area of the topic, or had personal experience of the topic or very strong interest in the topic. Weak prior knowledge related to the reader not having, being unaware of any previous knowledge, experience or interest in the topic. Prior knowledge was determined by reader response to interview questions.

Responses that repeated the author's message were categorized as "literal" interpretation of text, the lowest level. Readers who attempted to analyse text ideas were considered "analysis" level of interpretation. Readers who tried to combine text ideas with their own were categorized as "synthesis" level and those who evaluated text ideas were considered as "evaluative" level. The latter were the highest level of interpretation. Inter-rater reliability was achieved by having four individuals rate the categorization of interpretation separately.

Reading strategies reported by individuals were also collated. Categories of strategies were lifted from the data and used to describe individual reports of strategy usage. Examples of reading strategies can be found in Appendix 5. Reader awareness was assessed by determining the congruence between what strategies the reader purported using and evidence of their

occurrence.

Each participant was considered a case within a case-study methodology. The case study for each individual (intra-case performance) contained a personal profile that was created from the participant's own words. It also contained his recall and interpretation performance on each passage as shown in the reader's verbal protocol. The case-study also contained a description of his self-reported strategies and finally a summary of his overall performance. Differentiated performance between these eight students was compared (inter-case) for similarities as well as disparities.

The above methodology generated a very large amount of data. Some means was needed to refine the presentation of results without taking away from the richness found in the protocol of each reader. It was decided to present the data in table format. In accordance with Kintsch (1988), each participant's recall of text, termed textbase memory (TBM), was coded within the propositional templates described above. The individual's interpretation of text, termed situational model (SM), was also coded within the categorizations described above. Tables containing the readers' TBM and SM represent the reader's performance in understanding text. Participants and variables will be represented in this present study by codes, such as "Keith - TBM1" to mean Keith's textbase memory of passage 1. Some readers recalled and interpreted the text at the same time. Any non-text information was coded within the TBM as an intrusion, coded as (INTR). Intrusions are discussed within the context of each reader's SM.

Data analysis was carried out in two phases related to the two research questions: intra-case and inter-case. Firstly, the performance of individual participants (intra-case) was examined in the following sequence:

- A portrait of each reader was outlined.
- The reader's recall performance on Passage 1 (Appendix 1) was coded using the textbase template (Kintsch, 1988) framework. As shown in the template textbase (Appendix 2), there are 36 macro-level propositions in the semantic structure of Passage 1, including 6 global level (main) ideas and 30 supporting ideas. The main idea (Level 1) of Passage 1 is GLOBAL 297. The Level 2 ideas, or other global propositions, are other main ideas of the passage. Level 3 macro

propositions are ideas in text that support the main idea. Level 4 propositions, or micropropositions, are incidental or illustrative details to the theme of the passage. Any non-text information revealed in the reader's recall was categorized as an intrusion (INTR). Examples of reader intrusions can be found in Appendix 4.

- The reader's interpretation performance on Passage1 was categorized based upon the taxonomy of Bloom, B.S., Engelhart, M.D., Frost, E.J., Hill, W.H., & Krathwohl, D.R. (1956).
- The reader's recall and interpretation performance on Passage 2 was coded in the same manner. The main idea of Passage 2 was GLOBAL 299.
- Evidence was sought of participant self-regulation and awareness of their own processing to find congruence between what he said he did and what he actually did while reading. Appendix 5 contains examples of reader strategies.

Secondly, the performance among participants within the group (inter-case) was examined in the following sequence:

- The recall performance among all cases on Passages 1 and 2.
- Similarities and differences among all cases on Passages 1 and 2.
- The effect of reader intrusions on their interpretation of Passages 1 and 2. The kinds of intrusions made by readers in recall of each passage were identified as either inferential or metacognitive.
- Reader strategy usage and awareness.
- A synthesis of the results of the above information to detect patterns or trends in reading compensatory processes and strategies.
- An interpretation of these findings in the light of the research framework.

In drawing conclusions about the findings related to R.Q. 1, the literature about compensated reading and strategy usage was matched with observations of this present study to highlight new contributions to knowledge. In drawing conclusions about the findings related to R.Q. 2, the literature about LD reader metacognition was matched with the observations of this present study to determine new contributions to knowledge. The implications of findings from this research were then examined for practical application to future educational practise.

Limitations of the Study

The present study closely examines the reading performance of eight compensated LD readers. The limitations of this present study and what was done to address them are summarized below:

- It is widely recognised that LD individuals vary greatly in the degree of severity and nature of their disability and so these individuals may not represent the full range of variability within the target population. To address this concern, participants were selected from diverse backgrounds, age and gender.
- It is difficult to find two texts that have similar structure, appeal and of which the readers were likely to have equal prior knowledge. The texts selected for the present study were chosen as representative of adult-level, general domain reading tasks and matched for readability by a group of adults.
- Coding qualitative data may be subjective and other investigators could code the study data differently. To promote objectivity in coding, a group of teachers was taught the Kintsch propositional framework to assess participants' textbase memory and how to use the coding grid to code all participants' situational models and reading strategies. The raters coded all participants' textbase memory responses and compared results. Agreement was sought and reached on any differences among raters. The raters then examined all participants' protocols and referred to the coding grid for rater congruency. Again, rater agreement was sought and reached.

CHAPTER 4

ANALYSIS AND INTERPRETATION OF DATA

The methodology described above produced a large amount of data. In order to manage the quantity of data collected and to preserve the rich quality of information found in individuals' verbal protocols, the analysis and interpretation of data will be presented in three sections.

Section 1: Intra-case analysis and interpretation.

Section 2: Inter-case analysis and interpretation.

Section 3: Interpretation of intra-case and inter-case data related to Research Question 1 and Research Question 2.

In so doing the research questions can be discussed from several different perspectives.

SECTION 1: INTRA-CASE ANALYSIS AND INTERPRETATION

Each of the eight subjects will be considered a case to minimize ambiguities and to highlight the case study methodology used in this study. Passages 1 and 2 can be found in Appendix 1 and the template textbase of each, in Appendix 2. The case study includes a portrait, which was created using the reader's own words from the audio-taped interview in order to capture the dynamic of the individual, and a synthesis of the reader's performance on Passage 1 and Passage 2. The reader's recall performance was coded using the template textbase (found in Appendix 2) based on Kintsch's (1988) propositional analysis system. The reader's interpretation performance was coded using categories developed from those of Bloom, Engelhart, Frost, Hill and Krathwohl (1956). The reader's self-reported reading strategy usage was identified and evidence of this activity sought in his overall performance. As well the reader's awareness of his own strategy usage was examined for congruence between what he said he did and what he did actually do. Finally, a synthesis of each subject's overall performance is described. There are eight case studies, one for each reader.

CASE STUDY OF KEITH

Keith is an executive in an international computer company who specializes in developing educational software. He has undergraduate degrees in philosophy and computing science, also a postgraduate degree in educational technology. Keith is married with two children. He stated that at home and work "I avoid reading" unless it is critical. Reading is a "sober process for me, I have to focus, concentrate (and) be efficient - I cannot just sort of pick up a book and read the way I suppose other people do." Keith finds reading "visually quite difficult and slow " and uses a pencil, ruler or his fingertip to track his reading of text. He prefers text with high black/white contrast also dim lighting without a glare. To minimize the amount of visual processing of text, Keith tries hard to comprehend the "big picture" of text, stating "I deal with concepts and making connections between ideas." He has difficulty remembering "actual words" and prefers to remember in "little pictures" that he puts together into conceptual models "this is my main learning strategy." He also uses "diagrams and little charts." His company promoted him because it "values my creativity with computers and people skills." He considers that he inspires himself "I like to compete with myself - I don't need anything external to motivate me" acknowledging that success brings "respect from other people." To Keith "my family is my first success and then my professional work, in that order."

Keith's elementary schooling was in a French immersion setting "I was often called stupid, kept in after school to redo work. I cried a lot." There was little emotional support from his blended family and few books at home. "Early success would have made such a difference." Keith experienced difficulty in high school because many subjects involved memorization and learning was "difficult, repetitive and unchallenging." At university, when Keith found out that "learning could be personal, it started to get exciting." He selected courses that interested him and "the volume and the quality of my reading improved when I found I could make those connections." Audiotapes of lectures helped him to learn. A psychology lecture on dyslexia led Keith to seek assessment. The diagnosis of "mild dyslexia, relieved a lot of pressure and changed my life - it was easier to see myself as successful." "Motivation was the key" he said,

to persist when reading was difficult. His career in the computer industry "played to my strength." His strong desire "to undo in my heart what happened to me in school" led him to take a postgraduate education technology degree and to work in the field of educational software.

Keith's Textbase memory on Passage 1 (Keith - TBM1). Keith's recall, shown in Table 1, was coded using the propositional template of Passage 1 (see Appendix 2). Keith's textbase memory contained three propositions from the macrostructure of the text, one global and two macro propositions. These included "cloning has created a dialogue between theologians and scientists, which is a rarity" (GLOBAL 297), which is the passage main idea, and two supporting ideas - "it talked about how technology has gone past our ability to reason morally in the social context" (MACRO 7) and "whether it (cloning) would be used to good or evil" (MACRO 30). As well, Keith recalled 12 micro-level details such as "it was a science fiction sort of thing" (MICRO 12) and "this lamb was cloned" (MICRO 38). During recall Keith recalled information that was not in the text and was termed "intrusion." The intrusion "It wasn't really a big problem" [INTR 1] revealed how Keith evaluated what he interpreted as the "problem" of text. That is, how he evaluated the proposition (MACRO 7) as not "big." In so doing, Keith appeared to be constructing a model of the situation and a textbase memory at the same time, using a problem-solution schema or recall framework. Keith stated that his undergraduate courses in philosophy and religion provided him with prior knowledge of the cloning debate "I remember hearing about it on the radio. I have interest in it from the philosophical and religious standpoint, but I haven't really read a lot of science fiction."

Keith's Model of the Situation on Passage 1 (Keith - MS1). Keith interpreted, or modelled the situation of Passage 1 effectively at higher evaluative and synthesis levels. As shown in Table 2, he synthesized that cloning was a problem in being a "type of technology" that "was surpassing our ability to reason about it (and) to agree on what is ethical" and that different religions provide different answers to the problem. Keith had an affective response to the passage "it was interesting" and amusing although he evaluated it as "not very critically written" and "biased" toward religious rather than nonreligious views of cloning. He evaluated that "it was an ironic conclusion (that theologians decide the morals of the world)," that there

Table 1

Keith's Textbase Memory on Passage 1

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
47	MICRO*	"Human cloning"
7	MACRO	"It talked about how technology has gone past our ability to reason morally in the social context."
[1]	INTR	"It wasn't really a big problem."
12	MICRO	"It was sort of a science fiction kind of a thing."
38	MICRO	"This lamb was cloned"
41	MICRO	"in Scotland."
48	MICRO	"The possibility of human cloning"
55	MICRO	"how the theologians had difficulty"
72	MICRO	"some had more moral difficulty with it; others were more cautious about it."
30	MACRO	"whether it would be used for good or evil."
72	MICRO	"the concern was over the morality of the act, rather than the outcome"
81	MICRO	"from the theological standpoint."
117	MICRO	"concerns from some scientists"
116	MICRO	"were not terribly concerned about it."
301	MICRO	"but they were engaged in a dialogue."
297	GLOBAL	"Cloning has created a dialogue between theologians and scientists, which is a rarity."

(KEY - GLOBAL = global proposition, MACRO = macro proposition, MICRO = micro proposition)

Keith's total recall: 1 GLOBAL, 2 MACRO, 12 MICRO propositions

Table 2

Keith's Model of the Situation on Passage 1

LEVEL OF INTERPRETATION*	SUPPORTING STATEMENT
Evaluative	"It made me wonder what right theologians have in deciding the morals of the world."
	"It was an ironic conclusion [that] there should be a dialogue between religion and science when there would probably first need to be a dialogue between religions about the topic."
	"I think it was not a very critically written paper."
Synthesis	"The main assertion [was] that this type of technology was surpassing our ability to reason about it. I don't think it has. I think it has just surpassed our ability to agree on what is ethical."
	"I wondered why there wasn't a more nonreligious look at ethics [because] depending on which religion you turn to for your moral values you get a different answer."
Affective	"It was interesting, I was amused by it." (positive)

* **KEY**. Level of Interpretation of Text

Higher:	evaluation	reader evaluates text ideas with prior knowledge
	synthesis	reader synthesizes text ideas with prior knowledge
Lower:	analysis	reader analyses the author's message from text
	literal	reader interprets the author's message only from text
Affective		reader responds positively or negatively to text

should by a "dialogue between religion and science" but there was a need first, for a "dialogue between religions." Keith evaluated the text as "not very critically written." With prior knowledge of philosophy and moral debate, Keith was able to go beyond text information to identify gaps in the text message. He revealed self-awareness of his own comprehension processes and use of his prior knowledge as a filter on passage information "I was reading it critically from the stance of what I already knew."

Keith's Textbase Memory on Passage 2 (Keith - TBM2). As Table 3 reveals, on Passage 2 Keith recalled only one proposition from the passage's macrostructure "a group of people guaranteeing the loan" (MACRO 178), which was a Level 3 supporting idea. That is, Keith did not recall any of the main ideas (global propositions) from this passage. He also recalled many details from the microstructure of the text, for example "a professor" (MICRO 288) and "from Princeton" (MICRO 291), which were low in the propositional hierarchy of Passage 2. Keith appeared to have difficulty recalling the passage and evidence of this can be found in the intrusions he made during recalls that were errors: "in the space of a year or something" [INTR 1], which was not stated in the text; and "They were saying that they had something like a 97% success in repayment," [INTR 2] which was a reversal of information in text - "3%" default in repayment. The latter is noteworthy because Keith must have carried out a mental computation to reverse this information and may have recalled text information correctly but stored it differently. On Passage 2, Keith's intrusion [INTR 1] was a generalization inference but on Passage 2 his intrusions were errors. Keith had strong prior knowledge of Passage 1 and identified "making connections" as his main "compensatory mechanism", which in turn aided his comprehension of the text. On Passage 2, Keith knew he had weak prior knowledge, stating he was "unfamiliar with the topic", was "very anxious about reading the text", "this passage was hard for me, my eyes were sore." Keith knew he had difficulty "the second passage was harder to read from the understanding standpoint (and) I had to read this passage a little more creatively because I was not familiar with it." The errors shown in Keith's intrusions may be indicative of his difficulty in constructing an effective textbase memory.

Keith's Model of the Situation for Passage 2 (Keith - SM2). As shown in Table 4, Keith

Table 3

Keith's Textbase Memory on Passage 2

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
11	MICRO	"Large multinational banks"
58	MICRO	"trying to provide small loans to poor consumers"
195	MICRO	"It started off with third world countries"
26	MICRO	"now happening in the U.S."
[1]	INTR	"They had something like a 97% success rate in repayment." (Reversal)
60	MICRO	"100 dollar loans"
59	MICRO	"(no) collateral"
178	MACRO	"(but) a group of people guaranteeing the loan"
179	MICRO	"a bunch of co-signers almost everyone to do this for the community."
230	MICRO	"The concept had appeal in the States."
234	MICRO	"They doubled the number of similar types of happenings in the States '
[2]	INTR	"in the space of a year or something."(Error)
288	MICRO	"A professor"
291	MICRO	"from Princeton"
295	MICRO	"who said programs were done in South America - took 20 years to do them."
296	MICRO	"Communities which were educated attributed that to their success"
298	MICRO	"(They were)warned rushing into doing it could make people more poor (without) the community orientation where everyone was responsible"

Keith's recall totals: 0 GLOBAL, 1 MACRO, 13 MICRO

Table 4

Keith's Model of the Situation on Passage 2

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Synthesis	"I guess if it is true that they had success" "they would have made a profit"
Analysis	"So I was a little suspect of it when I first started reading it though I guess it sounded like a pretty interesting idea."
	"I kind of wonder how they, anyone became self-sufficient relying on government monies."
Literal	"I had no idea that a bank would lend money to somebody without collateral anywhere."
	"I kind of wonder what is in it for the bank aside from interest"
Affective	" I guess it sounded like a pretty interesting idea."

used the one macroproposition he recalled, "a group of people guaranteeing the loan"(MACRO 178) as a building block to construct his model of the situation of Passage 2 integrated with his personal banking experience. Keith stated that the topic was not familiar to him, although he said, "I am interested in money, I had experience with student loans." Without prior knowledge of community development process, Keith used his experience of bank loans as a framework and seemed to construct meaning on-line, that is he thought aloud about how he interpreted the passage. For example, he interpreted microlending as a banking strategy in which poor people were given no-interest loans. Because this did not match his own banking experiences, the idea puzzled him "I was a little suspect at first" (Keith - SM2). He synthesized text information, reflecting aloud "I guess if it is true they had success" although the incongruence between this and what he knew of banking made him infer that the banks must have "made a profit." Keith analysed the microlending concept and questioned whether it could lead to self-sufficiency. He was again puzzled by the idea of bank-loans as a means of helping people out of poverty, which caused him to question the efficacy of this kind of community aid "I kind of wonder how they, anyone became self-sufficient relying on government monies." Since he constructed a model of the situation using a banking rather than community development process framework, he interpreted microlending with puzzlement as a banking process "I had no idea that a bank would lend money to somebody without collateral anywhere", and with suspicion "I kind of wonder what is in it for the bank aside from interest." Keith also had an affective response to the passage, he liked it "I guess it sounded like a pretty interesting idea." Without recalling the text's main idea, which was that the goal of microlending was to educate communities to work together and share responsibility for their own financial independence, Keith was unable to evaluate passage information. However, he liked the topic "I guess it sounded like a pretty interesting idea" and relied on his own personal banking experience and reasoning aloud about meaning to make up for gaps in understanding the text. In this way, Keith was able to construct a higher level mental model of Passage 2.

Keith's Reading Strategies and Awareness (Keith - RS). As shown in Table 5, Keith used the strategies he said he did on Passage 1, although rereading was not confirmed. With

Table 5
Keith's Reading Strategies and Awareness on Passages 1 and 2

STRATEGY	WHAT HE SAID HE DID	CONGR-UENCE*	WHAT HE DID
Identify Main Points	"I tried to pull out what the main point was of the sentence." (P 1)+ "read each paragraph to try and understand it" (P 2) "understand the main topic of each paragraph" (P 2)	YES NO NO	Propositions (GLOBAL 297, MACRO 7 , 30) Keith only recalled 1 macrostructural proposition from paragraph 3.
Identify Bias	"trying to see what struggles there were in the text; it seemed like a pretty politically moded topic." (P 1)	YES	Keith identified the passage was biased toward science/ religious differences rather than human ethical differences.
Reflect	"I guess I backed off from it a little bit and looked for different perspectives on topic, think about it a little bit, [and] come up with an opinion" (P 1)	YES	Keith had his own opinion of text that the problem related to ethical not scientific debate.
Re-read	"read it again, re-read to clarify something." (P 1)	U/K	This strategy was not observed but may have taken place.
Use Prior Knowledge	"I just sort of thought about what I knew about religion, religious practise, theology, and science, and so on, and incorporated what I know with what I read to give it meaning." (P 1)	YES	"concern was over morality of the act rather than the outcome (MICRO 72)"
Visualize	"I used a little web, just to help me sort of position the main points, to see text direction" (P1)	YES	Keith used paper and pencil to draw a web-like diagram.
Identify Details	"I went back for the detail"(P 2)	YES	He recalled 12 micropropositions
Find Connections	"I had to kind of understand it first and then piece it together" (P 2) "skim, go back, look at the details then connect it together, synthesize it" (P 2)	NO YES	He did not link ideas. "I kind of wonder how they became self-sufficient relying on government monies"
Identify Main Idea	"I went to try and get the main idea"(P 2) "and understand the main topic of the text" (P 2)	NO	Keith did not identify the main idea of text but rather inferred it was banking.

* YES = congruence is evident NO = congruence absent or contrary is evident
U/K = unknown + = (P 1) = Passage 1, (P 2) = Passage 2

strong prior knowledge, he recalled the main idea (GLOBAL 297), interpreted at a high level and said reading it was "easy" for him. It appeared that Keith used reading strategies that helped him to gain higher levels of understanding, such as identifying bias and interpreting meaning, rather than to facilitate remembering text messages. Passage 2, on the other hand was unfamiliar to him. His strategy of "finding connections" helped him to recall the main idea and to link it to what he already knew. But his strategy "I went back for detail" had the outcome of Keith recalling 12 micropropositions that only supported and were not directly relevant to the main idea. Keith did not identify the main idea, and he was unaware of this. Keith seemed to know that he needed to "get the main idea" and his reading strategies on Passage 2 were more like memory than interpretation aids, unlike the strategies he used on Passage 1.

As shown in Table 5, Keith reported a range of strategies over the two passages, which would help in recall of the main idea, integration of text information with prior knowledge, and interpretation the meaning of text. Some, like using prior knowledge and reflecting worked for him and others strategies, like re-reading, did not. For greater efficiency, Keith would have to monitor his own usage, particularly on unfamiliar text. He was more aware of what he was doing on familiar than unfamiliar text. Although he knew when he was compensating for difficulties, he was not always aware when his strategies were unsuccessful.

Keith was able to construct higher level situational models of both passages, despite being unable to recall the main idea of Passage 2. On Passage 1, he used a metacognitive strategy of problem and solution schema to frame how he remembered the text and was able to recall the main idea. With strong prior knowledge he added more information to his model of the situation through inference, which helped him to interpret the passage at an evaluative level (Keith - SM1). Passage 1 was easier for him to interpret because of his knowledge and he was aware of this. Keith used inference and metacognition to help him interpret Passage 1.

On Passage 2, Keith did not recall any of the main ideas of the passage and recalled two supporting details erroneously. He was aware of his difficulty in recalling this passage and of his weak prior knowledge. Nonetheless, Keith used what was available to create a synthesis level model of the situation, drawing upon his general knowledge of banking, his

inferential reasoning abilities and awareness of his own understanding. He knew he had to "create meaning" in order to overcome his perceived difficulties. Keith's success in understanding Passage 2 at a higher level may relate to his use of inference and metacognition, but it may also relate to the "interest" in the topic. As a businessman, Keith may have had more prior knowledge of financing projects that he realized. Overall, Keith was able to comprehend both passages successfully despite having to compensate for recall difficulties on Passage 2.

Keith was aware of his strategy usage although he was not always aware when it did not work. It appeared that he had greater perception of his own strategy usage and effectiveness when reading familiar rather than unfamiliar text. For example, Keith was unaware he had not recalled the main idea of Passage 2. When reading unfamiliar text, Keith would need to carefully monitor his understanding of the text, as he was unaware of misunderstanding the main idea of Passage 2.

CASE STUDY OF GRAEME

Graeme is a 39-year-old high school teacher who is motivated by "curiosity, being inventive and helping others to avoid my (learning) problems." He is married with children and has worked as a paramedical assistant and civil servant before acquiring B.A. (Geography/ Biology) and BEd. degrees. Graeme coaches sports teams, teaches first aid courses, "I understand the human body, hands-on is easy for me" and leads youth adventure training camps, "I am a very social person, I like people." Reading is physically strenuous for him, "I can only read fifteen minutes tops" and very slow, "I need double the time and cannot skim read." "I haven't developed a joy for reading, I only pick up main topics from a book." His wife helps him read and write "she is my coach." He is a "kinaesthetic learner" "a very tactile person, my hands clue me in." "I like to animate what I want to do, close my eyes and see the structure and the flow." Visual/ tactile aids help him to learn "for example I learned about the heart muscles using rubber bands." Physical activity stimulates his thinking processes "it makes my mind active." At university he learned by listening, watching others and using audiotapes "something very technical I will read into a tape and play it back to myself." Talking is hard for him "I tend to be long-winded, I paint my picture as I go along." A tutor coached him to ask questions in lectures "I have a roundabout way of getting to the point and needed help." "I have a language processing problem, I need to ask questions to get it right."

Graeme grew up in a rural, non-reading family. Both parents left school in grade 3. He had early reading problems and was encouraged to "quit school and get a trade." His high school biology teacher called him a "big zero" yet he graduated from university with Biology honours "I persisted, I set goals." He said he knows his strengths and weaknesses in reading and writing "I have a good laugh at my mistakes now, like reversals" and has learned to compensate "it makes me inventive, as Captain Kirk says there is always another way." Graeme feels "respected" by his large extended family as a teacher. Academic success gave him confidence, which he lacked earlier in his life. He can now acknowledge his accomplishments "One of my sons has been identified as gifted at school and yet he's having reading problems. I think I am like that."

Graeme's Textbase memory on Passage 1 (Graeme - TBM1). While reading the passage, Graeme paced up and down the interview room, banging his forehead with his fist and reading some words aloud. Despite this effort, his textbase memory, shown in Table 6, revealed that he did not recall the main idea of Passage 1, although he did recall a Level 2 global idea "the pro's and con's of cloning" (GLOBAL 54). Graeme also recalled 14 supporting details, such as "replacing the dying child" (MICRO 277), "Dr. Butcher" (MICRO 21), as well as an error "Hawksley" [INTR 1] in which he seemed to have mixed up "Huxley" the science fiction author with Hawking the author-physicist with whom, he reported in the interview, he was familiar. That is, he seemed to put together the "Hawk" of Hawking and "xley" of Huxley to make "Hawksley" and was not aware of doing this. Graeme said he struggled to remember the text and had little prior knowledge of the topic. Graeme's intrusions included four inferences "(cloning was) possibly all right for animals but not for humans"[INTR 2], which may have been an attempt to interpret the passage discussion about cloning of humans and animals in relation to what he recalled as the main thrust of the passage, the "pro's and con's of cloning"(GLOBAL 54). A second inference, "it (the text) discussed implications and talks from different religions" [INTR 3] was an attempt to identify the text main idea by inferring a more general frame of reference of different religious viewpoints, missing out on the science viewpoint mentioned in text. A third, "that cloning replace intercourse by science and technology" [INTR 4] showed that Graeme generalized information in the passage about the Catholic preference in the text, of "natural reproduction" to infer information that was not stated in the passage. A fourth inference, "It is about the moral slippery slope of selective breeding of humans. That is the basics, what it, the paper, is about" [INTR 5] revealed Graeme's thinking aloud about meaning and his interpretation, repeated again in his situational model. Graeme was aware of his own understanding, as shown in his intrusion [INTR 5] and this helped him to perceive the efficiency of his own process. Graeme's main compensation for not recalling the main idea, was inference, which he used to provide additional building blocks of his textbase memory.

Graeme's Model of the Situation (Graeme - SM1). Graeme used building blocks from his textbase memory to model the situation of Passage 1 and as shown above, he appeared to

Table 6

Graeme's Textbase Memory on Passage 1

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
6	MICRO	"Dealing with cloning rules and ethics - "
21	MICRO	"Dr. Butcher"
20	MICRO	.". from Berkeley"
37	MICRO	"The person who cloned the ewe"
41	MICRO	"in Scotland."
[1]	INTR	"Hawksley (error)"
64	MICRO	"wrote in science fiction (about cloning)"
54	GLOBAL	"(The passage discusses) the pro's and con's of cloning"
61	MICRO	"arguing about cloning "
[2]	INTR	"possibly alright for animals, not humans"
125	MICRO	"Gave examples of immortality"
156	MICRO	"(such as) creating the perfect child"
277	MICRO	"replacing a dying child"
[3]	INTR	"(It discussed) implications and talks from different religions"
242	MICRO	"such as Judeo-Christian
254	MICRO	"the Vatican and how they would view that"
[4]	INTR	"cloning replace by intercourse by science and technology"
217	MICRO	"How Eastern religions view cloning .."
200	MICRO	"as reincarnation"
[5]	INTR	"That's it, that is what the text is about."

Graeme's Recall total: 1 GLOBAL, 14 MICRO

Table 7

Graeme's Model of the Situation on Passage 1

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Synthesis	"the paper says to me that we have to be careful to avoid the slippery slope and once you start down that the tendency is for people is to misuse and abuse technology as opposed to use it properly. Cloning can be seen in that way."
Analysis	"Cloning is very controversial .. I think that there's the pros and cons to both sides "
Affective	"It was interesting."

interpret the text at the same time as he recalled it. As Table 7 shows, he synthesized text ideas as a discussion of the moral "slippery slope"of cloning also "the misuse and abuse of technology, as opposed to using it properly." He analysed cloning as "very controversial" with both "pros and cons" to its usage. Graeme had an affective response to the text, finding it "interesting", which may have motivated him to understand it. Despite difficulty in recalling the main idea, Graeme was able to construct a model of the situation that showed a higher level of interpretation.

Graeme's Textbase memory on Passage 2 (Graeme - TBM2). Graeme said he had strong prior knowledge of the second text having recently taken an advanced degree course in this area. His textbase memory, showed in Table 8, revealed that he recalled 3 of the 4 global propositions of this passage. These included the main idea. "It (microlending) is an evolutionary process and they have to develop, or (microlending will) make the poor more in debt by what they are doing" (GLOBAL 299) and two other main ideas of text structure "get these poor people up and started in a business" (GLOBAL 69) and "we need to continue it and get more loans out to 100 million poor" (GLOBAL 135). He recalled two supporting macro-level ideas (MACRO 178) and (MACRO 12) and a large number of micropropositions (n = 22), such as "by the year 2005"(MICRO 293), which were supporting details of the text message.

Despite having strong prior knowledge, Passage 2 was as physically demanding for Graeme as Passage 1. Graeme again paced, recited and knocked his head with his hand. His intrusions included two errors, firstly "2000 people" [INTR 1] and secondly "2 million people were given these loans"[INTR 2]. His third intrusion was an inference in which he evaluated the usefulness of microlending "it seems to be a very good program, working very well" [INTR 3] compared to other programs with which he was familiar. Graeme's textbase memory showed that he had recalled much of Passage 2 macrostructure despite expending time and energy on remembering supporting details, and making errors. He had understood the text message and recalled the main idea.

Graeme's Model of the Situation on Passage 2 (Graeme - SM2). Graeme's model of the situation shown in Table 9, revealed that he used his strong prior knowledge to evaluate the

Table 8

Graeme's Textbase Memory on Passage 2

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
5	MICRO	"seamstresses"
6	MICRO	"carpenters"
7	MICRO	"street vendors"
12	MACRO	"not being able to get money as traditional loans from banks"
18	MICRO	"depend on family members with"
15	MICRO	"interest rates as high as 10% per day"
28	MICRO	BancoSol
[1]	INTR	2000 people
27	MICRO	microloans
58	MICRO	"small loans"
60	MICRO	"$100"
69	GLOBAL	"get these poor people up and started in a business"
200	MICRO	"a meeting in the States where internationally people ... support this idea"
111	MICRO	"2500 representatives"
109	MICRO	"from other 13 different countries"
104	MICRO	"Grameen in India or Pakistan or that area, do this type of loan"
264	MICRO	"Indonesian Bank of Reiiack"
[2]	INTR	"2 million people were given these loans"
268	MICRO	"return rate is very high"
190	MICRO	"less than 3% of people don't repay loans"
173	MICRO	"a group of people"
178	MACRO	"someone within the group will guarantee loan - people supporting people"
237	MICRO	"not a new concept"
241	MICRO	"in Germany a form of credit unions"
238	MICRO	"in the 19th century"
242	MICRO	"credit unions still exist but they are there"
245	MICRO	"to support the middle class"
[3]	INTR	"it seems to be a very good program, working very well"
135	GLOBAL	"we need to continue it and get more loans out to 100,000,000 poor"
293	MICRO	"by the year 2005"
299	GLOBAL	"but it is an evolutionary process and they have to develop or (microlending will) make the poor more in debt by what they are doing."

Graeme's recall totals: 3 GLOBAL, 2 MACRO and 22 MICRO

Table 9

Graeme's Model of the Situation on Passage 2

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Evaluative	"there is a need to help people and this is another way to get people out of debt responsibly" "without giving them a loan that gets them so far in the hole that they can't climb out" "perhaps this is the way to go, it seems to be successful"
Synthesis	"I don't know what the equivalent would be here. I think of people getting a loan here for $30,000 who can't climb out of the hole." "This might be a way to support someone not for $30,000 but a small loan that might get the person going, they can manage that and see light at the end of the tunnel"

text. He evaluated microlending using his knowledge of community development process as "another way of (getting) people out of debt responsibly", "this is the way to go, without giving them a loan that gets them so far in the hole that they can't get out." Graeme used his personal knowledge of banking to synthesize text information about taking out a loan "a small loan that might get the person going" and the usefulness of this "I think of people getting a loan here for $30,000 who can't climb out of the hole." He also inferred the analogy, microlending was "a light at the end of the tunnel" compared to repaying a larger debt. As Table 9 revealed, Graeme evaluated the message of text and interpreted it effectively.

Graeme's Reading Strategies and Awareness (Keith - RS). On the whole, Graeme was aware of how he processed text, as shown in Table 10. He stated in the interview that he knew he was a "kinaesthetic learner" who needed to use physical activity to help him read. His strategy use and observed performance confirmed this, for example, on Passage 1 when he said he "hit the names and places", he literally hit himself on the head and recited this information aloud. Graeme read as he said he did on Passage 1, except it was unknown if he reread, reflected and mentally visualized text, or not. However strategies such as identifying details and rereading seemed to help him recall rather than interpret the texts. Graeme had weak prior knowledge of Passage 1, and his strategies did not help him to recall the main idea, although he did construct a higher level interpretation. On Passage 2, Graeme had strong prior knowledge and used the strategies he said he had, such as remembering details and visualizing text. These strategies again helped him recall micro-level details, but other strategies such as prior knowledge also enabled him to interpret text effectively. Graeme used his prior knowledge of this passage to read successfully.

Graeme appeared to use a great deal of physical energy to read the two passages. He used compensatory strategies to carry out the two tasks and was aware of doing so. On both tasks, Graeme remembered a great amount of micro-level details that were of little importance in recalling the main idea of the texts. As well he made several errors. On Passage 1 he did not remember the main idea and Graeme's intrusions provided clues to both the way he was constructing meaning and how he overcame lack of textbase building blocks for his situational

Table 10

Graeme's Reading Strategies and Awareness on Passages 1 and 2

STRATEGY	WHAT HE SAID HE DID	CONGR-UENCE	WHAT HE DID
Identify Details	"I read the first paragraph I looked it over four times and I hit the names and places and moved onto the next paragraph and went back to first to compare. I did that through the article back/forth, up/ down." (P 1)	YES	He recalled 14 micro propositions.
	"in this case no names but facts, things, numbers, names that would jump up were new" (P 2)	YES	He recalled names "Bancosol, Grameen" and "$100" (MICRO 60)
Slow down and Focus	" I started several lines, I was pulling words out so I tried to concentrate on what I was reading so I had the context correct, because sometimes I reverse words which changes the meaning" (P 1)	YES	He walked up and down and shut his eyes
Reread	"reread several times" (P 1)	U/K	-
Reflect	"and consciously structure the meaning in my head. New material takes longer to see and link things together" (P 1)	U/K	-
Use Prior Knowledge	"I was about to fill in a lot of the blanks" (P 2)	YES	He identified that"this is another way of doing it (aid) to get people out of debt responsibly"
Visualize	"a diagram in my head" (P 1)	U/K	-
	"I would try to picture one person standing on a farm has his hands up that there would be a connection for me" (P 2)	YES	He did use his fingers during recall and interpreted the process as "one man and one loan."
	"I talk myself through it. If I can visualize I will do it that way" (P 2)	YES	He shut his eyes and talked to himself.

model, by using inference and metacognition. On Passage 2 Graeme's textbase recall was outstanding in that he remembered the main and most of the supporting ideas of the text. He also used inference and awareness to close gaps in understanding. Graeme also appeared to need time for processing and recalled more information from the text in a later interview. He was determined to remember the passages. Despite the heavy demands reading made on Graeme, he was able to construct effective situational models of both passages.

CASE STUDY OF JEFFREY

Jeffrey is a 43-year-old research scientist. He has a Ph.D. in Agronomy and considerable experience in high-level government research projects. He publishes scientific articles and participates in academic conferences in his field. Jeffrey is married with three children. Reading has always been "hateful" for him. When Jeffrey experienced reading problems in elementary school, his parents immediately arranged tutors and private schooling for him. "At age eleven we read the Bluebird play aloud in class. It was very, very stressful. I prayed for one or two lines and sweated bullets to memorize them before my turn." He stated his Scottish mother was his "real strength." "I was very good at sports that made me friends, but I had a lack of standing in language and in maths. The headmaster told Dad I wouldn't go on to university. Dad was so proud when I received my PhD and angry with the headmaster."

University was a turning point for Jeffrey, his "reading improved dramatically" because of "the challenge of solving a problem." He prefers to think and communicate in visual images "math is easy for me, I think in diagrams, math formulae, geometry." Jeffrey wrote his Master's thesis in mathematics "in a week nonstop." Currently, he reads "probably less than most in my kind of work." Instead of reading journals he prefers to "listen and be sociable." "I try to use other people's thoughts. I wander a lot to chat. My desk is next to the coffee machine and I learn things over coffee, not from a book." In general "I avoid reading when I can" because "it is still hateful."

Despite negative experiences and a current need to avoid reading, Jeffrey does not feel disadvantaged by his reading difficulties, quite the reverse. Jeffrey thinks he overdeveloped his strengths because of his weaknesses "it's like a balloon, if you squeeze some place signifying that area is not well developed, then some other area will develop - in my case my love of math was developed as a result of my focus on spatial things." "It has not held me back, but it (reading) is still tiring and painful." Jeffrey knows he has developed compensatory strategies to cope with the heavy literacy demands of his position, such as avoiding reading and learning by listening. "I never read a speech at a conference. I use keywords."

Jeffrey's Textbase memory on Passage 1 (Jeffrey - TBM1). Jeffrey did not recall the main idea of the text as shown in Table 11, although he recalled four supporting ideas or macropropositions that appeared to support the viewpoint he held toward the cloning topic. Jeffrey had very strong prior knowledge of cloning, having conducted cloning experiments on "tobacco plants." He also had a bias toward cloning that he was unwilling to put aside and influenced his recall, "I already have a feeling about cloning which will slant my interpretation of it"[INTR 1]. Jeffrey recalled macropropositions that supported his viewpoint "the issue is if it is good or bad for mankind, that is a moral and ethical question" (MACRO 30), "man is part of nature and his actions are as valid as other actions in nature" (MACRO 223) while acknowledging the moral dilemma posed by the technology "referred to cloning as perhaps a technical parallel to reincarnation for some religions (MACRO 200), "Roman Catholicism looked upon it, as not a good thing" (MACRO 254). Despite strong prior knowledge and awareness of bias, Jeffrey did not recall the main idea of Passage 1. Jeffrey recalled micropropositions that he was aware of being "new" to him such as the "religious perspective" (MICRO 60), "cloning from the theological, moral and the scientific perspective" (MICRO 248). Despite revealing that he was unfamiliar and uninterested in religious viewpoints, Jeffrey's micro-level recall and macro-level recall, for example "cloning as perhaps a technical parallel to reincarnation for some religions" (MACRO 200) appeared to focus on this information "That is the way I interpret it (the text) but I don't understand reincarnation, not being from that culture"[INTR 2].

In recalling the passage Jeffrey may have adopted not only a pro-science stance "I agree science is neutral"[INTR 1] but also a defensive stance to his own scientific work. The effect of this was that he remembered text propositions that defended cloning experiments, such as "man is part of nature and his actions are as valid as other actions in nature" (MACRO 223) and those that presented the opposing view, the "religious perspective"(MICRO 60). Stating he agreed with the former. Since the text main idea related to the need for cooperation between science and religion, taking this stance prevented him from remembering the main idea of the passage. His intrusions "I agree science is neutral"[INTR 1], "I don't understand reincarnation

Table11

Jeffrey's Textbase Memory on Passage 1

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
248	MICRO	"Cloning from theological, moral and scientific perspective"
[1]	INTR	"My feeling on it, the trouble is I have already a feeling about cloning which will slant my interpretation of it is. I agree Science is neutral and that humans thought in essence that"
223	MACRO	"Man is part of nature, his actions are as valid as other actions in Nature."
30	MACRO	"The issue is if it is good or bad for humankind - that is an ethical and moral question"
17	MICRO	"raised by a scientist"
60	MICRO	"The religious perspective"
200	MACRO	"referred to cloning as perhaps a technical parallel to reincarnation for some religions"
[2]	INTR	"That is the way I interpret it but I don't understand reincarnation not being from that culture."
254	MACRO	"Roman Catholicism looked upon it, as not a good thing"
259	MICRO	"not natural reproduction."

Jeffrey Recall Totals: 0 Global, 4 Macro and 4 Micropropositions

not being from that culture"[INTR 2] are also early building blocks of his model of the situation.

Jeffrey's Model of the Situation on Passage 1 (Jeffrey - SM1). Jeffrey modelled the situation of text within the framework he used in recalling text, as shown in Table 12. He made the affective response that cloning was a "hot issue" because, he explained "we are in the research branch (at work)", which could confirm his defensiveness during recall. He did not evaluate the passage critically as might be expected of someone with strong prior knowledge, focussing instead on what information from the passage was new "this particular article was nothing new to me - the only area new was the religious area, the ethical aspects of the discussion" and what was known, as he had during recall. Nor did he synthesize text information, nor analytically or literally describe it. Jeffrey's model of the situation reflected his affective response and awareness of his own understanding. He took a pro-science stance toward cloning that may relate to the strong attention currently in the media toward the ethics of cloning, which could have made him defensive. With few building blocks from textbase memory, Jeffrey had little text information and much personal bias to help him model the situation of Passage 1. With acceptance of his "slant"and no will to change it, Jeffrey knew he chose to interpret the passage from a viewpoint of bias.

Jeffery's Textbase memory on Passage 2 (Jeffrey - TBM2). Jeffrey recalled the main idea of Passage 2 "the caveat - there needs to be an evolutionary process ingrained in cultures they are in, educational wise and vocationally, to try to accelerate this process may be to jeopardize it, putting the loan process in place without underpinning fundamentals in the culture may be putting people more in debt" (GLOBAL 299). He did not have an affective response to Passage 2 and was able to use his prior experience of agricultural development projects and summer employment in a bank to construct an effective textbase memory as shown in Table 13. Jeffrey also recalled two other supporting ideas from the text macrostructure "collateral is provided by a peer group"(MACRO 178) and "collateral secures the loan as opposed to assets of which they have none" (MACRO 173). As well, he recalled 15 micropropositions, for example "small loans to impoverished people" (MICRO 53) and "in the 19th Century (Germany) had a credit union process" (MICRO 238) that did not prevent him from recalling the main idea.

Table 12

Jeffrey's Model of the Situation on Passage 1

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Affective	"It (cloning) is a hot issue*. We are in the research branch (of agriculture) and so this particular article was nothing new to me - the only area new was the religious area, the ethical aspects of the discussion" (*positive or negative affect)

Table 13

Jeffrey's Textbase Memory on Passage 2

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
139	MICRO	"Microfinancing"
53	MICRO	"small loans to impoverished people"
85	MICRO	"to help themselves, become self-sustaining, self-employed or employed."
242	MICRO	"This concept has been around for centuries actually"
241	MICRO	"microfinancing has been carried out in the cooperative banks in Germany"
238	MICRO	" in the 19th Century had a credit union process"
227	MICRO	"Washington is mentioned as an example"
[1]	INTR	"my understanding from the article - the way these loans work"
178	MACRO	"collateral is provided by a peer group"
169	MICRO	"to a person applying for a small loan"
48	MICRO	"to establish a business"
[2]	INTR	"there is peer pressure"
173	MACRO	"collateral secures the loan as opposed to assets of which they have none"
190	MICRO	"only about 3% are delinquent or loss"
252	MICRO	"this is notable for banks doing this kind of work"
[3]	INTR	"I used to work for a bank and 3% delinquent is not bad"
182	MICRO	"It [microlending] is well-established"
195	MICRO	"in un- and developed countries"
231	MICRO	"250 countries"
206	MICRO	"including the U.S."
[4]	INTR	"Going beyond what is there - is the idea [that] the bank must have some equity to fall back on. They need guarantors - peer groups provide this - someone else to twist the bank's arm to say okay so that banks feel more secure in lending, so the issue at the end
299	GLOBAL	"the caveat - there needs to be an evolutionary process ingrained in cultures they are in, educational wise and vocationally, to try to accelerate this process may be to jeopardize it, putting the loan process in place without underpinning fundamentals in the culture may become putting people more in debt.
[5]	INTR	"Using debt as a means of raising people out of their squalor is dubious"

Jeffrey's Recall Totals: 1 GLOBAL, 2 MACRO, 16 MACRO

Jeffrey's intrusions show that he compensated for recalling many micro-level details instead of macrostructure, by inferring additional, associated information. For example, Jeffrey used his bank knowledge "my understanding from the article - the way these loans work" [INTR 1], to understand the micro-loan process and infer the business efficiency of the concept "I used to work for a bank and 3% delinquent is not bad" [INTR 3]. He was also able to elaborate upon the text "Going beyond what is there - is the idea the bank must have some equity to fall back on. They need guarantors - peer groups provide this - someone else to twist the bank's arm to say "okay" so that banks feel more secure in lending"[INTR 4]. He also inferred the generalization "there is peer pressure (in groups)"[INTR 2]. Jeffrey's final intrusion "using debt as a means of raising people out of their squalor is dubious" [INTR 5], appears to be an evaluation of the microlending concept and a building block of the situational model. Jeffrey recall of Passage 2 was effective. He remembered the main idea and used his strong prior knowledge, as shown in the above intrusions, to overcome gaps in recall of the text macrostructure.

Jeffery's Model of the Situation on Passage 2 (Jeffrey - MS 2). Jeffrey also utilized his strong prior knowledge to model the situation of text. He was able to synthesize text information and construct a higher level interpretation of Passage 2 as shown in Table 14. Jeffrey used a problem and solution schema to do this and drew upon his own experience "with C.I.D.A." to identify the aid process as a "problem" of "dependency" with microlending as a solution "at the grass-roots level." In pulling together text ideas, he interpreted that a loan given in this way brought "self-reliance, self-esteem" to the poor and was a solution to the problem since it encouraged them to "be self-sustaining." Jeffrey also compared microlending to his work experience and analysed that it was similar to the "fiscal restraint" his department was experiencing in which they were "leveraging our dollar", with industry matching government grants to double the money available for research "dollar for dollar." Microlending was similar in giving "(people) a loan, make it viable." He inferred that the loan would be "seed money (which) comes back to you indirectly." Jeffrey used his prior knowledge to construct a higher level interpretation of this passage.

Jeffery's Reading Strategies and Awareness (Jeffrey - RS). Jeffrey was aware of compensating for difficulty as shown in Table 15. On Passage 1, with strong prior knowledge,

Table 14

Jeffrey's Model of the Situation on Passage 2

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Synthesis	"I do work with C.I.D.A. and the concept of doing things at micro or grass roots level, this is one example of it, of doing things at the grass-roots level which helps to overcome the dependency problem."
	"This is the same in other programs. The essentials are the same. The dependency problem - a loan brings self-reliance, self-esteem."
Analysis	"I interpret this as similar to what is going on at work. We are having major cutbacks and budgets in research, we try to work with industry and are trying to leverage our dollar - for every $ we put in we get our industrial partner to put in a $ ($2 work of research for $1). This kind of process is in a decline in aid, rather than handing out equity to people now here is a loan, make it viable, you will be able to pay us back, use that money, be self-sustaining, roll over the money instead of aid handing over the $s. It is seed money and comes back to you indirectly"

Table 15

Jeffrey's Reading Strategies and Awareness on Passages 1 and 2

STRATEGY	WHAT HE SAID HE DID	CONGR-UENCE	WHAT HE DID
Read for Interest	"I was reading for interest's sake. I am interested in the new"" (P 1)	YES	"I already have a feeling which will slant my interpretation"
Identify Main Points	"I consciously order points in my head and read for main ideas" (P 1)	U/K	Serial order of recalled propositions may reflect this.
Reread	"something new - I reread, if I am not understanding I reread" (P 1)	NO	Religious views were new he said, but he did not reread them.
Use Prior Knowledge	"(use) what is familiar. this guy said it, Coleman, prior knowledge" (P 1)	YES	Evident in his abstraction of man as part of nature.
Slow down and Focus	I am conscious when I am reading if I am not paying attention, I have to focus" (P 2)	U/K	May have been covert.
Visualize	"translate the words that I said (sub-vocally) into a picture" (P 2) "I visualize in concrete and abstract, in the form of geometry, math, try to draw relationships" (P 2)	U/K	May have been covert.
Sub-vocalize	"I mechanically move my tongue, say the words, it's not visible but is still there"(P 2)	YES	He whispered to himself while reading.
Find Connections	"I draw several parallels, find connections for example cloning and tobacco, parallel issues" (P 2)	YES	He said "I did research on tobacco", "I know about genetic manipulation of material"
Identify the Big Picture	"I don't consider names important, I read for meaning, the big ideas" (P 1) "I am becoming a big picture person, was detail-oriented, lazy though now and the big picture is easier - I broaden out from details now" (P 2)	NO YES	He recalled his own viewpoint rather than the text viewpoint. With no strong viewpoint, he did recall a global proposition (GLOBAL 299).

he had some awareness of how he read, but if he read for interest as he said, this was not evident since he did not recall or interpret "the new" ideas, as he thought he had. It was unknown if he consciously ordered ideas in his head, as he said he had. Jeffrey though he had remembered "the big picture", but was unaware he had not. He did not appear to reread the text, as he said he had, despite that he said there was "new" information for him in it. He did use prior knowledge as he said he had, although this may not have helped him, as he thought it had. On Passage 2, Jeffrey appeared to read at a moderate pace but may have slowed down and focussed covertly, as may have been his "visualize" strategy. He did sub-vocalize unfamiliar words and find connections between ideas. On Passage 2 Jeffrey was aware of his own process and used his strong prior knowledge to effectively interpret the text. He described that he was able to "broaden out from the details, to understand the big picture", as he recalled the main idea (GLOBAL 297). Jeffrey was aware he used prior knowledge to help him comprehend text.

Jeffrey performed differently on the two passages despite having strong prior knowledge of both. He also used strategies to help him read and was aware of doing so. He did not recall the main idea of Passage 1, and knew he had taken a biased stance in interpreting it. Jeffrey may have been defensive. His model of the situation(Jeffrey - SM1) showed that he was unable to override his strong affective response to the topic and this influenced both his recall and interpretation ability. On Passage 2 this did not happen and prior knowledge facilitated his understanding of the text. Jeffrey recalled the main idea of the passage and although he recalled little else from the text macrostructure, he was able to use inference from his own experience to close gaps in understanding instead. His model of the situation(Jeffrey - SM2) showed that Jeffrey interpreted the text by synthesizing text ideas within the framework of his prior knowledge. Despite strong prior knowledge and personal experience of both topics, Jeffrey appeared to have difficulty recalling the main ideas of Passages 1, and of Passage 2, since he remembered only a few important ideas from the latter passage. However, he interpreted both effectively. His performance on unfamiliar text is not known.

CASE STUDY OF JACK

Jack is a 33-year-old computer systems manager in a government research department. He was the most visibly nervous of all participants during the interview. Jack is married with one child and has a computer science degree. His wife is a "great organizer" and helps him to overcome his difficulty in writing and spelling. He said he has strong people skills "I get along easily with people, I can listen and make friends." Jack works in a field "that plays to my strengths, I write computer programs, you just have to be consistent. Spelling is my worst problem but in my job (you don't have to) spell right, you can name a variable FRED, spell it FRD, it doesn't matter. I have a creative way with numbers and visuals, and think of different ways of doing things because I have to." "I have always been curious. I enjoy learning but I don't expect to learn it first time unless it is something physical. If I can do it physically, then it's easier." In school Jack was frustrated at being misunderstood and under-challenged "the teacher said, 'To Kill a Mockingbird was too hard for me.' So I went off and read it at home for myself, slowly. I had an awful time with the teacher. She'd say if I was so smart, how come I didn't know anything." At home, his mother turned him off reading as a teenager by telling him he was a poor reader and adult books were too hard for him.

University was easier for him "I just sat back and listened." He sought assessment in order to be allowed more time on a written exam. Jack learns best by listening "I'm easy to listen, I just take it in and remember almost the whole, entire thing. If I wrote it down I would miss what they were saying." His writing difficulties hold him back "there's ideas that I want pushed but I have to use Power Point to explain myself but I'm afraid I'll read it wrong to them", He thinks his social and computer strengths won him early promotion "I have patience, I can explain well (verbally) and I persist at something until it is done right." He frequently mixes up words and has difficulty using a dictionary. Jack avoids reading because it is slow and frustrating, "I would like to reading faster." He is improving his spelling by helping his Grade 2 son with his homework "I don't expect it to be right the first time." Jack needs to take a written exam for promotion and his wife helps him to prepare "it is a long, scary process for me. If I get to interview, I'll get the job, but I have to write and spell well to apply and get to interview."

Jack's Textbase Memory on Passage 1 (Jack - TBM1). Jack said he had "limited" prior knowledge of cloning but an interest in science fiction. As shown in Table 16, his textbase memory showed that he did not recall the main idea of Passage 1. Jack did recall one supporting idea, a Level 2 global proposition from the macrostructure of the text "it discusses the theological questions about the morality of cloning and ethical ramifications of the cloning issue which needs to be discussed by scientists and the religious" (GLOBAL 18), which integrated some of the passage ideas. Jack also recalled seven Level 4 micropropositions, such as "there are problems with cloning"(MICRO 26) and "scientists involved in cloning and the ethical side"(MICRO 42), which were supporting details of the main idea of the passage. Jack said he was very nervous reading Passage 1. He responded to questions as little as possible.

Jack's Model of the Situation on Passage 1 (Jack - MS1). Despite not recalling the main idea and having limited prior knowledge, Jack constructed a model of the situation that revealed he had interpreted the text message at a higher, evaluative level "this piece is not saying anything positive about cloning but that having a dialogue between science and religion is a good idea", which could indicate that he had in fact have remembered the main idea. As shown in Table 17, Jack also synthesized that there should be further discussion before proceeding "saying that cloning is something that should be discussed before people go racing forward" and "some proponents are saying if there's a chance to go ahead, go ahead." He analysed that the passage "suggests moving up to the forefront something that was in a science fiction realm, moving it up into dialogue with ordinary people, discussing it." Jack read science fiction books, and used this as a framework within which to comprehend the passage at a higher level of understanding despite having few building blocks from textbase memory to aid meaning construction.

Jack's Textbase memory of Passage 2 (Jack - TBM 2). Jack said he was less nervous reading the second passage. He had strong prior knowledge of development programs, having worked on a similar welfare project in Canada. As shown in Table 18, he used this resource in recalling Passage 2. Jack recalled the text main idea "you can't just throw money at them you have to educate them as well" (GLOBAL 299) and one supporting macroproposition, "(microlending was) about lending money" (MACRO 20). Jack's textbase memory included

Table 16

Jack's Textbase Memory on Passage 1

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
301	MICRO	"The passage is about cloning"
18	GLOBAL	"It discusses the theological questions about the morality of cloning and ethical ramifications of the cloning issue which needs to be discussed by scientists and the religious"
26	MICRO	"There are problems with cloning"
42	MICRO	"scientists involved in cloning and the ethical side"
16	MICRO	"interviews with psychologists, a piece from psychologists"
242	MICRO	"Christian and Jewish theologians"
35	MICRO	"reference the latest development of the sheep in Scotland"

Jack's Recall Totals: 1 GLOBAL, 0 MACRO, 6 MICRO

Table 17

Jack's Model of the Situation on Passage 1

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Evaluative	"The piece is not saying anything positive or negative about cloning but that having a dialogue between science and religion is a good idea"
Synthesis	" saying that cloning is something that should be discussed before people go racing forward"
	"Some proponents are saying if there's a chance to go ahead, go ahead"
Analysis	"it suggests moving up to the forefront something that was in science fiction realm, moving it up into dialogue with ordinary people, discussing it"

Table 18

Jack's Textbase Memory on Passage 2

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
20	MACRO	"It's about lending money to"
53	MICRO	"people with no collateral"
194	MICRO	"in third world countries, to back up their loans"
31	MICRO	"Banks in Bolivia and other countries too"
225	MICRO	"looking at it as a means of moving people"
[1]	INTR	"we are involved in this kind of stuff, moving them out of welfare into workfare"
68	MICRO	"and poverty"
9	MICRO	"into being self-sufficient"
214	MICRO	"money (for example) to build up a food-stand"
27	MICRO	"money to get started (in business)"
206	MICRO	"Americans thinking about this also"
[2]	INTR	"There was a brief discussion at the end, a bit convoluted, I had trouble with the last paragraph, it seemed to say"
299	GLOBAL	"you can't just throw money at them you have to educate them as well"

Jack's Recall Totals: 1 GLOBAL, 1 MACRO, 9 MICRO

Table 19

Jack's Model of the Situation on Passage 2

LEVEL OF INTERPRATION	SUPPORTING STATEMENT
Evaluation	"it suggests they are looking at a new way of doing things"
Synthesis	"as opposed to just handing people money on welfare which tends to cycle them around to just staying on welfare"
Analysis	"that will allow people to get out of debt"

nine microlevel details such as "people with no collateral" (MICRO 53) and "banks in Bolivia and other countries too" (MICRO 31). Jeffrey's intrusions reveal his use of inference "we are involved in is this kind of stuff, moving them off welfare onto workfare" [INTR 1] and his use of metacognition, or awareness of his own understanding "there was a brief discussion at the end, a bit convoluted, I had trouble with the last paragraph, it seemed to say" [INTR 2]. Despite recalling many micro-level details, Jack was able to recall the main idea of text (GLOBAL 299) by inferring linkage between microlending and his own work experience.

Jack's Model of the Situation on Passage 2 (Jack - SM2). As shown in Table 19, Jack had both strong prior knowledge and the main idea of the passage as a building blocks in constructing an effective model of the situation. In his recall of the passage, Jack had noted the caveat on passage information of the need to "educate people"(GLOBAL 299). He evaluated the text message as a "new way of doing things" and by using what he knew of development projects as a reference, Jack also synthesized that it was different to "just handing people money." He analysed that the strategy could be successful and "allow people to get out of debt." Prior knowledge provided Jack with a source of reference from which to evaluate, synthesize and analyse Passage 2 propositions, which he used efficiently, and he used it effectively.

Jack's Reading Strategies and Awareness (Jack - RS). Jack reported using only one reading strategy, that of identifying the "big picture" of Passage 1, as shown in Table 20. He did recall one global proposition (GLOBAL 18), which was a Level 2 proposition from the text macrostructure. However he did not recall the main idea (GLOBAL 297), as he said he did. On Passage 2, Jack had strong prior knowledge and reported three strategies. He identified the main points as he said he had, since he recalled the main idea (GLOBAL 299). Jack said he used the strategy of recalling key words and ideas, and he did recall the main idea (GLOBAL 299) and another Level 3 macro-level proposition "it's about lending money" (MACRO 20), although no other ones. It was difficult to determine whether Jack used a reflective strategy as he said he had, as he said very little. He may have done this covertly, since he was able to recall and interpret Passage 2 effectively.

Jack was a man of few words, unlike all the other participants who spoke frequently while carrying out the two reading tasks. He was anxious during the session, responded

Table 20

Jack's Reading Strategies on Passages 1 and 2

STRATEGY	WHAT HE SAID HE DID	CONGR-UENCE	WHAT HE DID
Identify the Big Picture	"I just read, didn't write anything down, if you asked me names I couldn't tell. I just go for the big picture." (P 1)	YES	Global Proposition (GLOBAL 18)
Identify Main Points	"I look for the main points" (P 2)	YES	He recalled (GLOBAL 299)
Key Words	"I read it as if it were a discussion, I read it for the key words and ideas" (P 2)	YES	He recalled (MACRO 20) and (GLOBAL 299)
Reflect	"I think about it and argue with it as I go through" (P 2)	U/K	-

minimally to questions and did not visibly relax until the reading part of the interview was over. Jack used strategies to help him comprehend the passages and was aware of doing so. His textbase memory of Passage 1 (Jack - TBM1) showed that he did not recall the main idea, but instead recalled details that were irrelevant to the main idea of the text. Also he reported that he had weak prior knowledge of the topic. In his model of the situation(Jack - SM1), there was no evidence of his inferring additional information or of making metacognitive statements revealing awareness of his own understanding, resources that helped other readers. Nonetheless, Jack was able to successfully evaluate Passage 1. On Passage 2, which was a more familiar topic to him, Jack's textbase memory (Jack - TBM2) was effective and revealed that he recalled the main idea of the passage. However he also recalled many micro-level details that may indicate difficulty. His textbase intrusions revealed that he inferred association between the text and his own work experience, which provided additional building blocks to his model of the situation(Jack - SM2). Jack also interpreted Passage 2 at higher, evaluative level.

CASE STUDY OF NATALIE

Natalie is 24 years old, single and in the final year of an undergraduate degree in criminology. She was a ski instructor for two years "out west and then I travelled." Two of her five siblings are doctors and two are lawyers. One brother is at Harvard "on a full scholarship for a math PhD." Her father is a successful surgeon. "I was non-academic, different from the rest of the family." Natalie couldn't read in Grade 3 although she was "very good at math." Her mother abandoned the family at this time "I thought she left because I wasn't doing well, I just couldn't read. Then the next year a teacher I liked and was helping me, died." Her mother disappeared for ten years and was identified as manic depressive. With little support for her reading problems, and a new step-family, Natalie dropped out of high school early. "When I left school my Dad took me to the technical section of the university, this pink room with typewriters, to be a secretary. I knew I could do more. It made me mad and determined."

She travelled and worked for a few years, later enrolling in a university degree program "Sports helped me. I am very competitive and good at sports, that gave me confidence." She was assessed as "dyslexic." This "took away the anxiety, LD is okay, I am not stupid." Wanting to be on the "varsity soccer team" kept her at her studies "I had to study full-time, pass the selection process and pass my exams to stay on the team. Being on the team made me get organized. My friends are all on the team." "To succeed in my courses, I have to be make lists and prioritize, to watch my time." "I know myself better now as an adult, my strengths and weaknesses." She has learned to talk to her professors and find out what is important "I read very selectively." Reading is still "very slow" and "reading aloud is painful." "I expanded my vocabulary with travel, doing and seeing things, that helps me a lot." "Counselling was great in dealing with my reading problem and my anger related to my Mom." Natalie wonders about her future "I want to go to physiotherapy school and I need good grades. I can inspire myself to do this. Special Services helped me though." People say "I told you over and over again, how come you don't understand." They get impatient, I get frustrated and this barrier comes, I feel stupid, everything is scrambled, I forget what I am thinking. I had to learn to be patient with myself, to explain my needs to other people. They usually have someone like me in their family."

Natalie's Textbase memory on Passage 1 (Natalie - TBM1). Natalie had weak prior knowledge of cloning. Her textbase memory showed that she did not recall any global propositions from the text. As shown in Table 21, Natalie did recall three supporting macropropositions "It (the bible) didn't really have a problem with cloning" (MACRO 99), "to reproduce a perfect image"(MACRO 159) and "(these are) morally questionable (reasons)" (MACRO 73). She also recalled nine micropropositions or supporting details also from the text including "ethical reasons" (MICRO 114) and "moral reasons why not to clone" (MICRO 3).

Natalie seemed to adopt a framework of "reasons for cloning", for example, "the bible didn't really have a problem with cloning" (MACRO 99) and "reasons against cloning", for example "to reproduce a perfect image"(MACRO 159) (which are) "morally questionable (reasons)" (MACRO 73). This dichotomy was reflected her propositional recall. She overcame gaps in her understanding of the text message by inferring additional information, as shown in her intrusions, "Doctors with different backgrounds had different opinions" [INTR 1], which was a generalization of text information, and "but at the same time the reasons for cloning, not that recreation of man would be a bad thing but why humans would clone is the problem - the wrong reasons" [INTR 2], which was also an inferred generalization of text information. Natalie had difficulty recalling Passage 1. She did not recall the main idea, remembering a few supporting ideas and nine micro details from text instead. With little prior knowledge to help her, she relied on her framework of "reasons for/ against cloning" to remember what she could of the passage.

Natalie's Model of the Situation on Passage 1 (Natalie - SM1). Natalie was nervous and responded minimally. Nonetheless, she was able to construct an effective model of the situation of Passage 1, as shown in Table 22, despite poor recall and weak prior knowledge. She evaluated the passage as being about whether cloning was "appropriate" for humans, suggesting that "it is a question of (it not being) right to do on humans." Natalie analysed that cloning was a science fiction "thing" that was becoming real and was currently "in debate." She had few resources to help her model the situation of the text yet she was able to infer generalizations "it is a science fiction kind of thing, that is the debate right now (but it is becoming) more like reality" (Natalie - SM1). Inference helped her to compensate and while this did not aid her recall of the passage, it may have aided her interpretation since Natalie was able to construct a higher level

Table 21

Natalie's Textbase Memory on Passage 1

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
2	MICRO	"It was about cloning"
67	MICRO	" and problems that might occur if humans start cloning"
38	MICRO	"The lamb"
41	MICRO	"in Scotland"
114	MICRO	"ethical reasons"
3	MICRO	"moral reasons why not to clone"
[1]	INTR	"Doctors with different backgrounds had different opinions"
252	MICRO	"talked about the Vatican and the church - the bible and what it says about cloning "
99	MACRO	"It (the bible) didn't really have a problem with cloning "
[2]	INTR	"but at the same time the reasons for cloning, not that recreation of man would be a bad thing but why humans would clone is the problem - the wrong reasons"
274	MICRO	"donor purposes"
277	MICRO	"replace a dead child"
159	MACRO	"to reproduce a perfect image"
73	MACRO	"(these are) morally questionable (reasons)"

Natalie's Recall Totals: 0 GLOBAL, 3 MACRO, 9 MICRO

Table 22

Natalie's Model of the Situation on Passage 1

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Evaluation	"It was trying to convey whether cloning is appropriate for humans" "It is a question of (it not being) right to do on humans"
Analysis	"it was a science fiction thing" "that is the debate right now" "but now more like reality"

model of the situation despite these limitations.

Natalie's Textbase memory Passage 2 (Natalie - TBM2). Natalie also had limited prior knowledge of the Passage 2 microlending topic, although she had recent experience of taking out a loan "I was looking into financing a small food business with my boyfriend" and was aware of the need in banking, for "credit, a solid job, a middle-class background or a cosigner." As shown in Table 23 below, her textbase memory revealed that Natalie did not recall the text main idea, nor any global propositions. She did recall two supporting ideas from text macrostructure including "(microlending started) as a model to help (individuals)" (MACRO 237) and "it (microlending) works well" (MACRO 193). As well, she recalled nine micro-level propositions, such as "(people are) used to paying 10% interest (on a loan)" (MICRO 16) and "it is [happening] in Asia, 3rd world countries"(MICRO 264). Natalie's recall intrusions included an error "it originated in three western countries"[INTR 2], a generalization inference "(microlending) which is relatively new to developing countries"[INTR 1] and an elaboration inference, which was beyond information in text "people generally quick to pay back on time"[INTR 3] and since it was not stated or implied in the text, could also be considered an error. With little prior knowledge, Natalie had difficulty recalling Passage 2 and did not recall the main idea.

Model of the Situation (Natalie - MS2). As shown in Table 24, Natalie was again able to construct a high level model of the situation, which showed her ability to overcome her lack of prior knowledge and recall of the main idea. Her model of the situation showed that she evaluated microlending as "a good thing" that could help the poor "become rich" and help women, whom she inferred are "suffering the most because of unfair bias." Natalie also had an affective response to the text message, which she found "interesting""suggesting "everyone should have a chance to succeed" (including her), which may relate to her recent business experience. Natalie also showed an affective response in her suggestion that "women are suffering the most because of unfair bias." She stated in later interview that she had recently taken a class in women's studies and was aware of women's poverty issues. Although Natalie reported weak prior knowledge of the microlending topic after reading passage, she seemed to be able to utilize her own banking experiences effectively to help her infer meaning and construct a higher level interpretation of Passage 2.

Table 23

Natalie's Textbase Memory on Passage 2

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
139	MICRO	"It talks about microlending"
[1]	INTR	"which is relatively new to developing countries"
[2]	INTR	"It originated in 3 western countries" [Error]
237	MACRO	"as a model to help [individuals]"
59	MICRO	"you don't have to have a certain status or credibility"
193	MACRO	"it [microlending] works well"
190	MICRO	"people are quick to pay back debts - low (error?), loaners are quick to pay back debts - low default rates"
[3]	INTR	"people generally quick to pay back on time"
16	MICRO	"used to paying 10% interest"
264	MICRO	"it is [happening] in Asia, 3rd world countries"
194	MICRO	"now in the States"
206	MICRO	"had conferences about it"
200	MICRO	"small businesses have boomed, grown, based on this"
116	MICRO	"[small businesses] have increased based on this [microlending]."

Natalie's Recall Totals: 0 GLOBAL, 2 MACRO, 9 MICRO

Table 24

Natalie's Model of the Situation on Passage 2

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Evaluative	"[Microlending] is a good thing."
	"It might help poor become rich." "[Women] are the ones especially in developing countries who are suffering the most because of unfair bias"
Affective	"I was not aware of it before, I learned about microfinancing, a new concept for me - also it caters to women which is interesting"
	"[Women] are suffering the most because of unfair bias"
	"Everyone deserves a chance to succeed."

Table 25

Natalie's Reading Strategies and Awareness on Passages 1 and 2

STRATEGY	WHAT SHE SAID SHE DID	CONGR-UENCE	WHAT SHE DID
Skim Read	"I am easily overwhelmed by the amount of text and skip through, read part of it" (P 1)	U/K	Natalie did read quickly.
Read for Interest	"I read from interest, I generally don't read easily but I am very interested" (P 1)	YES	Natalie took a standpoint against cloning in her situational model
Reflect	"The topic was interesting. It made me think about my life. [It] was personal." (P 2)	YES	Model of the situationcomment "I wonder if [it] is available to me"
Slowdown	"I try to get through it once and really concentrate" (P 2)	YES	Natalie read through the text without looking up .
Identify the Main Points	"I pick out what is important"(P 2)	YES	She did recall 2 macropropositions (MACRO 237, 193).

Natalie's Reading Strategies and Awareness (Natalie - RS). As shown in Table 25, Natalie read as she said she did. She reported skim reading because she was "easily overwhelmed by the amount of text" although it was not evident that she did so. She reported she "read for interest" on Passage 1, and she did take a standpoint against cloning in her interpretation of the passage, which could indicate interest in the topic. On Passage 2, Natalie stated she used a "reflect" strategy about the meaning of the passage and "about my life, it was personal" and did make the comment in her model of the situation"I wonder if (it) is available for me" (Natalie - SM2). She also did "try to get through it once and really concentrate" as she said she had. Natalie stated she used a strategy to identify the main points of the story, "I pick out what is important" and did recall two Level 3 macropropositions (MACRO 237, 193) that she may have considered important.

Natalie was the youngest of the group and had the least academic experience. Nonetheless on both tasks, she was able to overcome poor recall of text macrostructure and high recall of micro-level details, which may be evidence of her reading difficulties. Also she used strategies to help her read and was aware of doing so. Natalie's performance over the two passages was somewhat similar, although she appeared to have greater prior knowledge of Passage 2. With weak prior knowledge and not recalling the main idea of either text, she had few resources to help her interpret the passages. However, Natalie's performance showed that she was able to interpret both passages at a higher level of comprehension despite these drawbacks. She was nervous, spoke minimally before the debrief interview and only in response to task questions. As shown in her recall intrusions, Natalie compensated for not recalling any Level 1 or Level 2 ideas by inferring additional information, thereby closing any gaps in understanding and enabling her to construct effective models of the situation for both texts. Both texts were unfamiliar to Natalie and her performance on a familiar text is unknown. Her performance on both tasks seemed to indicate that she both had difficulty recalling unfamiliar text, but that she was competent in using whatever comprehension resources were available to her to compensate and interpret effectively.

CASE STUDY OF BELINDA

Belinda is a 39-year-old part-time nurse/administrator, who is married to and works with a family doctor in a small town. She is the mother of four children, including a Downs Syndrome son, and advocates for special needs children. "Having been teased mercilessly myself as a child for my spelling, and feeling different, I understand." As a child Belinda was identified as "dyslexic" because of her severe, early reading and spelling difficulties. She received strong support from her medical professor father and full-time mother. "I was never made to feel bad about it. I had endless support." In junior high Belinda had a tutor, who helped her to succeed and persevere in her strong desire to learn despite her persistent difficulties. "Being good at mathematics gave me confidence, particularly in high school. Some of her coping strategies in school "were devious tricks such as writing i and e together, write it sloppy and stick a dot between it, then the teacher will read it as spelt correctly anyway." Having three older brothers who looked out for me helped too." She took a health science degree with the help of a tutor, who helped her set study goals and write papers but "the faculty wouldn't let me have a tutor until I failed a course." During her study, formative assessment was introduced rather than summative assessment and this helped to alleviate her stress. Her performance improved.

Despite a successful professional career, Belinda still has reading and spelling difficulties, especially when tired or unwell "I can't take my reading for granted." "I like silence when I write. If I'm stuck, I'll do something practical like embroidery then words might come out the way I want them. Spellcheck and dictionaries don't help me spell, you must be able to recognise the word to use them. I have a wordbook, with just words in it, I look at it until I see the word I want. One of the big problems of living in Canada for poor spellers, is the mixture of American and Oxford spelling, best to stick to one. I still make silly mistakes like reversing letters. I use a pre-coded bank card." Belinda considers her greatest strength to be her attention to detail, and her people skills "as a student I could put sheets on so they wouldn't rub the patients' damaged heel, I could empathize with them." Things are "like math puzzles to me. I am a strong visual learner with 3D technicolour films in my head." "I have to pace myself carefully and manage my time "break things into manageable bits. Computers and tapes help me to read and learn."

Belinda's Textbase memory on Passage 1 (Belinda - TBM1). As shown in Table 26, Belinda recalled the main idea of the passage "apart from anything else, it is forcing theologians and ethicists to talk with scientists, they tend to be far apart and don't discuss matters"(GLOBAL 297). Her textbase memory showed that she also recalled two other supporting ideas from the text macrostructure including "man may misuse it (cloning)"(MACRO 228) and "any reproductive technology is interfering with the way things should be" (MACRO 260). Belinda recalled 13 propositions from the text microstructure, such as "the successful cloning of a lamb from the DNA of a ewe"(MICRO 37) and "in Scotland" (MICRO 41). As a medical professional and parent of a special needs child, Belinda said she had strong prior knowledge of the topic. Three intrusions in Belinda's recall of the passage showed she inferred generalization of some text information "has been brought into more obvious debate since"[INTR 1], "we are moving to being able to clone humans" [INTR 3] and "different religious groups look at this differently"[INTR 4]. A fourth intrusion showed that Belinda had metacognitive awareness of her own comprehension "I forgot the name of the doctor"[INTR 2]. With strong prior knowledge, Belinda recalled the main idea, some supporting ideas and many details of Passage 1.

Belinda's Model of the Situation on Passage 1 (Belinda - MS1). Belinda was able to use her strong prior knowledge and recall of the main idea as building blocks of her model of the situation, as shown in Table 27. She evaluated "that western society" is narcissistic in wanting "the perfect child" and should be more accepting and respectful of individual human differences. She suggested there was "danger" in cloning technology in the potential for "wonderful power" and also for destruction, using the analogy of the outcome of "splitting the atom." Belinda synthesized the ideas in the text "there are a lot of issues" related to the use of cloning that should be discussed "we go forward" with technology. She gave the example of the "perfect child" proposing it would be difficult to ensure it did not have "various" other problems "through other means." Belinda had a strong affective response to the text also "It basically discussed a lot of issues I am concerned about. It (cloning) worries me. It is like playing God." In later interview she revealed that she had been pressured by doctors to abort her special needs child and this had greatly disturbed her husband and herself. Having a strong affective response did not,

Table 26

Belinda's Textbase Memory on Passage 1

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
38	MICRO	"The issue of cloning"
[1]	INTR	"has been brought into more obvious debate since"
37	MICRO	"the successful cloning of a lamb from the DNA of a ewe"
41	MICRO	"in Scotland"
[2]	INTR	"I forgot the name of the doctor"
16	MICRO	"looked at the ethical issues"
48	MICRO	"raised by being able to clone (humans) "
[3]	INTR	"we are moving to being able to clone humans"
78	MICRO	"ethical issues such as would cloned humans have a different value."
274	MICRO	"Would they just be cloned for body parts?"
270	MICRO	"to replace a dying child"
[4]	INTR	"Different religious groups look at this differently"
203	MICRO	"Some cultures believe in reincarnation"
202	MICRO	"a soul moves from body to body"
201	MICRO	"(reincarnation) fits in with cloning"
242	MICRO	"the Judeo-Christian background, belief from a R.C. point of view is that"
260	MACRO	"any reproductive technology is interfering with the way things should be"
228	MACRO	"man may misuse it (cloning) and"
25	MICRO	"this is evil"
297	GLOBAL	"apart from anything else, it is forcing theologians and ethicists to talk with scientists, they tend to be far apart and don't discuss matters."

Belinda's Recall Totals: 1 GLOBAL, 2 MACRO, 13 MICRO

Table 27

Belinda's Model of the Situation on Passage 1

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Evaluative	"western society alludes to this - very narcissistic. We want the perfect child"
	"There are going to be individuals in society who are different and we must accept them and treat them with the same respect as the rest."
	"There is a danger. Science can be wonderful, like splitting the atom, we know we can get wonderful power from it and do wonderful thing. But it can also be used destructively to kill people."
Synthesis	"There are a lot of issues we should generally discuss before we go forward with this kind of science. We have to look at what we are doing with cloning"
	"Even if you have a child that is perfect, genetically the child can, through other means, have various problems"
	"(Science can be wonderful) but we have to look where we are going with cloning too"
Affective	"It basically discussed a lot of issues I am concerned about"
	" it (cloning) worries me, life is not that simple."Cloning is like playing God"

however, prevent her from interpreting the text at a higher level.

Belinda's Textbase memory on Passage 2 (Belinda - TBM2). As shown in Table 28, Belinda did not recall the text main idea, although she recalled two supporting ideas from the macrostructure of Passage 2, including "it is done to a group - a group will back up the person borrowing" (MACRO 178) and "which is better than banks have with their corporate customers in the first world" (MACRO 193). Belinda reported that she had weak prior knowledge of the topic and used her own banking experience as a resource. Her textbase memory (Table 28) shows she recalled 10 micro-level details such as "by someone in the World Bank about microfinancing" (MICRO 50) and "the sum may be as small as $100" (MICRO 60) from the passage.

Belinda's intrusions in her recall of the text revealed that she closed her gaps in understanding the passage by using inference, including generalizations "before individuals in that kind of a situation who maybe wanted money so they could set up a little cart to sell flowers or something, would have to go to family to borrow and because everyone is in the same boat of poverty, there is no money to borrow"[INTR 1] and "probably to my mind, (this) would do much more to combatting all the world poverty that we keep hearing about than just trying to throw in aid money"[INTR 2]. The latter intrusion appeared to be Belinda's interpretation. Her recall of the passage could indicate that she had in fact remembered the main idea, which was a caveat that education must accompany funding of aid projects or future success of the project may be jeopardized, although she did not explicitly state this. Belinda seemed to construct her textbase memory and, building blocks of her model of the situation at the same time.

Belinda's use of the word "imminent" in the first lengthy intrusion [INTR 1] may be an interesting choice of words, as she explained later it was a substitution of "imminent" meaning ready now, for "eminent" meaning important or superior, in reference to microlending and as such, related to her earlier comment that "words get jumbled up in my head, I mix meaning and sound and make mistakes." However, mixing the idea of immediacy and importance related to impoverished peoples, may also have been Belinda's original blend of the words and ideas "I get these new ideas, new words." Although Belinda recalled some ideas from the text macrostructure, she did not recall the main idea of Passage 2.

Table 28

Belinda's Textbase Memory on Passage 2

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
50	MICRO	"by someone in the World Bank about microfinancing"
67	MICRO	"A bank lends a small sum to an individual who has neither collateral or any kind of guarantee to back up that loan"
178	MACRO	"it is done to a group which will back up the person borrowing so each of the backers"
179	MICRO	"will guarantee that person will repay the sum"
60	MICRO	"the sum may be as small as $100"
48	MICRO	"so they can get started in some kind of a business"
71	MICRO	"and work their way out of poverty"
116	MICRO	"this has worked very well in Bangladesh and Bolivia"
65	MICRO	"they were talking about the setup in Bolivia. "
[1]	INTR	"It is something I have heard about and it makes imminent sense to me that before individuals in that kind of a situation who maybe wanted money so they could set up a little cart to sell flowers or something, would had to go to family to borrow and because everyone is in the same boat of poverty, there is no money to borrow"
190	MICRO	"The results they have had - only a 3% late payment on their loans and smaller defaulting of payment"
193	MACRO	"which is better than banks have with their corporate customers in the first world"
206	MICRO	"in North America"
[2]	INTR	"probably to my mind, (this) would do much more to combatting all the world poverty that we keep hearing about than just trying to throw in aid money."

Belinda's Recall Totals: 0 GLOBAL, 2 MACRO, 10 MICRO

Model of the Situation of Passage 2 (Belinda - SM2). As shown in Table 29, Belinda constructed a high level interpretation of text despite lack of knowledge and recall resources. As with Passage 1, Belinda had an affective response to the topic, although a moderate one "I think it is a neat idea." She synthesized text ideas by using the analogy of the "North American Indians" and people from inner cities who live on "welfare" payments. Belinda revealed in her interpretation that she had recalled the main idea of the passage "you would have to have the infrastructure set up to do this, to provide education, it's a slow process." Again she used inference to synthesize her memory of textbase with her own banking experience, suggesting that to get a bank loan, collateral or credit history is needed but if "a group act as collateral" for the individuals "someone will speak to their name." "It makes sense (to me)." Belinda analysed that microlending was a plan to educate people for independence, which is better than "throwing money at them." Belinda's model of the situation showed that she used inference to draw from her weak prior knowledge of banking and welfare agencies. This helped her to create an effective model of the situation and interpret text effectively.

Belinda's Reading Strategies and Awareness (Belinda - RS) Belinda seemed to be very aware of how she reads. As shown in Table 30, she read as she said she had and used the same two strategies, re-read and reflect on both passages. On Passage 1 she did indeed reread as she said she had, although it was unknown whether she identified the main points or not. On Passage 2 Belinda again reread as she said she did. She said she also used "reflect" and "slow down to focus" and she appeared to do so. Belinda was aware of how she read and of compensating for reading difficulties. She reported that reading can be physically and mentally effortful "I occupy my hands while I think about it (text meaning)." Belinda needed to take her time in reading a text and reported using only four strategies in reading. Nonetheless, Belinda was aware of their usefulness in helping to understand text and compensate for reading difficulties.

Belinda was able to recall the main idea of a familiar passage but not an unfamiliar one. She was also able to interpret a familiar passage at higher evaluative level and an unfamiliar one at higher synthesis level. On Passage 1, Belinda was able to use her strong prior knowledge as a source of inference and her metacognitive strategies to compensate for textbase difficulties, as

Table 29

Belinda's Model of the Situation on Passage 2

LEVEL OF THOUGHT	SUPPORTING STATEMENT
Synthesis	"(This is like) the problem of the north American Indians, because of the way the reserve system is set up, sets up a cycle of dependency and welfare that we cannot seem to break, same with people in cities across North America."
	"You would have to have the infrastructure set up to do this, to provide education - a slow process"
	"Individuals cannot get bank loans cannot get loans (everywhere) because they have not collateral or credit history. But a group act as collateral. Someone will speak to their name and see they are hardworking.. a loan to start up - it makes sense"
Analysis	"this is the way we should be trying to help people in areas of poverty not just in the 3rd world"
	"you have to provide education to individuals to change that mind set (cycle of poverty), a lot more involved than throwing money at them"
Affective	"I think it is a neat idea"

Table 30

Belinda's Reading Strategies on Passages 1 and 2

STRATEGY	WHAT SHE SAID SHE DID	CONGR-UENCE	WHAT SHE DID
Re-read	"I had to reread passages as sentences were quite complicated, sometimes I misread and had to go back" (P 1)	YES	Belinda read the text and then went back and read it again.
	"This was harder to read, succinct, didn't have to reread as much" (P 2)	YES	Belinda did reread the text
Identify Main Points	"I read "facets" as "facts" and it made no sense, I tried for the main gist of the sentences" (P 1)	U/K	Not observed although she did recall (GLOBAL 297) the main idea.
Slow Down and Focus	"I read better if I am rested. I have to slow down and focus or I get totally muddled, reverse numbers and make minor silly mistakes" (P 2)	YES	Belinda read and reread slowly
Reflect	"comparing things to what I heard or read and my own thought on this topic"(P 1)	YES	Belinda did give her own viewpoint in her intrusions and situational model.
	"If words don't come out the way I want them to I occupy my hands while I think about it, let my subconscious work on it" (P 2)	YES	Belinda tidied up the table.

shown in her errors and high micro-level recall (Belinda - TBM1), which she seemed to use to close gaps in understanding. On Passage 2, she was able to overcome lack of resources and compensate in this way (Table 30). Belinda later recalled the main idea while constructing a model of the situation(Belinda - MS2) that may relate to slow speed of processing. Her substitution error and high micro-level recall could relate to word level difficulties. Despite this, Belinda effectively interpreted both passages.

CASE STUDY OF BRENDA

Brenda is a 44-year-old physician who is a partner in a busy family medical clinic. She is divorced and has two teenaged children. Brenda felt that she was "advantaged by being educated in an impoverished rural school, with few books apart from some Asterix cartoon books." Although her teacher was an Anglophone, most of the students were Francophone and lessons were usually conducted very slowly, and in English. Instruction was largely oral to help the majority learn English. Listening/ speaking skills were stressed, with little formal reading/writing. In this environment, Brenda flourished "I learned to listen - there was no competition, so I did great there and learned a lot. I was lucky in my schooling." On later moving to city school in Grade 6, she had "big problems", scored "zero on a reading test" and first encountered failure. Reading and spelling continued to be a problem for her in high school and she developed study strategies to compensate, for example rereading text and reciting information to aid recall. However Brenda had a strong interest in and did well "in math and science", which helped her to gain confidence.

In medical school, she found reading/writing "hard." She had "no memories of fun, I didn't see the Rocky Horror Show - my youth was hard in study." "I missed few lectures, I had a good memory for lectures which saved me reading." "To learn something new, I ask myself questions, why this or that." Curiosity drove her to learn "I have to get to the bottom of things." "I code things, to sort it out in my head. I love to learn and fit new ideas together." Brenda said reading is still slow and difficult for her "I misread words very easily, paraphrasis, word slips, especially when I am tired." "I got a sinking feeling when you handed me that text, all those big words. I didn't realize how much I really don't like reading." "Reading takes me longer compared to my colleagues, I have to allow more time. There is a heavy reading requirement in medicine. I'd rather watch a video than read a book. Listening is a godsend for me." Brenda uses her finger to track her place in text and sub-vocalizes words she does not recognize. She has developed a special shorthand that she taught her colleagues and staff, and uses it in patient files. Brenda feels having "dyslexia" slows her down and limits her options "it takes away from my free time" although recently "I been learning how to have fun, like learning to sail boats." "Joy of learning"

for example about alternate medicine, is what currently inspires her. Brenda is in much demand for counselling sessions by her patients who appreciate her listening abilities. Her office is very neat "I like to be organized" with lots of colourful diagrams of the body and charts of symptoms and treatments on the walls. "Don't show me text or tell me, show me - think of visual, draw it, lots of diagrams."

Brenda's Textbase Memory on Passage 1 (Brenda - TBM1). Brenda recalled many of the main ideas of the text. With a medical degree and a "strict Catholic upbringing," she reported strong prior knowledge of Passage 1. As shown in Table 31, she recalled the main idea of text "at least science and technology are talking to the ethicists of the world" (GLOBAL 297) and two Level 2 global propositions - "the moral, ethical and philosophical consequences of cloning" (GLOBAL 18) and "the issues which arise from the possible cloning of human beings"(GLOBAL 54). Her textbase memory also contained one Level 3 macroproposition "the Vatican is unlikely to validate cloning of human beings "(MACRO 254). Brenda also recalled 12 micropropositions, or supporting details such as "for the purposes of cloning a little person, for example a dying child" (MICRO 270) and "of cloning a lamb"(MICRO 38).

Brenda's intrusions reveal her awareness of her own process "the statement I most remember is (the Vatican is unlikely to validate cloning of human beings)"[INTR 1] "which was very interesting"[INTR 2] and the generalization inference that human cloning was "a stretch of the imagination"[INTR 1], which may be a building block of her situational model, that is, how she interpreted the cloning text. Brenda's textbase memory showed that she effectively recalled the main ideas.

Brenda's Model of the Situation of Passage 1 (Brenda - MS1). Brenda had strong prior knowledge of Passage 1 and also recalled the main idea (GLOBAL 297) and these resources could have helped her to construct an effective model of the situation. But Brenda was cautious about believing the text information, stating in her recall that "it (cloning) was a stretch of the imagination" [INTR 1] that appeared to be an evaluation of the both, of human cloning idea and of its future. Also she seemed to be uncomfortable discussing the topic, which may have been due to her religious beliefs and perceived professional position as a family physician (the interview took place in her office). In her response to the interpretation question, as shown in

Table 32, Brenda synthesized the ideas she recalled from the text suggesting that the "largest

Table 31

Brenda's Textbase Memory on Passage 1

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
2	MICRO	"It was about cloning"
18	GLOBAL	"the moral, ethical and philosophical consequences of cloning"
42	MICRO	"the new experiment"
38	MICRO	"of cloning a lamb"
37	MICRO	"from the DNA of a ewe "
41	MICRO	"in Scotland"
36	MICRO	"by Dr. Wilmut"
54	GLOBAL	"the issues which arise from the possible cloning of human beings"
[1]	INTR	"a stretch of the imagination, the statement I most remember is"
254	MACRO	"the Vatican is unlikely to validate cloning of human beings "
[2]	INTR	"which was very interesting"
280	MICRO	"the Rabbi said at least one good thing comes out of this discussion of cloning human beings"
297	GLOBAL	"at least science and technology are talking to the ethicists of the world"
72	MICRO	"So there is the argument that the cloning of human beings might not be ethical for example"
270	MICRO	"for the purposes of cloning a little person, for example a dying child"
274	MICRO	"or an organ donor"
142	MICRO	"or for vanity"
156	MICRO	(or for) cloning the perfect child."

Brenda's Total Recall: 3 GLOBAL, 1 MACRO, 12 MICRO

Table 32

Brenda's Model of the Situation on Passage 1

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Synthesis	"The largest concern from cloning was with regards to possible use in cloning humans - you can clone a lamb but there is difficulty in cloning human, morally."
Analysis	"There is a discussion of ethics or morality of cloning an animal from DNA.

concern (of the passage is that) was with regards to possible use in cloning humans - you can clone a lamb but there is difficulty in cloning human, morally," which may represent her interpretation of the text information, and was a generalization of the various viewpoints in the passages. It may also represent her own moral judgement on the issue. Adopting a neutral, cautious stance to the topic, she analysed that the text discussed "the ethics or morality of cloning an animal from DNA." In her mental model, Brenda appeared to integrate what she knew about human reproduction and ethics, with her high recall of text macrostructure. She interpreted some information about the morality of cloning found in the text, did not infer additional association, nor did she wish to speculate on the ethical implications of human cloning, which she regarded as a "stretch of the imagination."

Brenda's Textbase Memory on Passage 2 (Brenda - TBM2). Brenda had weak prior knowledge of Passage 2 although she had "once met a woman doctor from Calcutta at a medical conference." As shown in Table 33, although she did not recall the main idea of the text, Brenda did recall two Level 2 global propositions, "to help people set up businesses in poor areas, to people without collateral" (GLOBAL 69) and "to help up to 100 million people by the year 2005"(GLOBAL 135), which were important ideas in the text message. Brenda also recalled one other macroproposition or supporting idea "to a person, rather one of a group in a culture"(MACRO 173). In total, she recalled three propositions from the text macrostructure. Brenda also recalled 18 micropropositions or supporting details such as "lend small amounts of money" (MICRO 58) and "(Grameen Bank) loans to the poor" (MICRO 67).

Brenda made several intrusions while recalling Passage 2, which included an error "a convention in Chicago" [INTR 1] and repetition of the error "the convention was in Chicago" [INTR 4]. Other intrusions made by Brenda, were inferences drawing from her general knowledge of banking and aid agencies "banks want to know more about it for the purposes of helping a few more poor people get out of debt or a nonprofit organization."[INTR 2], "in agriculture they can (do it) successfully"[INTR 3] and "the groups of people concerned about poverty in developing countries have had their own challenges, this is finding the best way to help"[INTR 5]. These inferences added information to Brenda's recall of the passage and provided additional building blocks to her situational model.

Table 33
Brenda's Textbase Memory on Passage 2

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
49	MICRO	"It was about banking, the World Bank"
48	MICRO	"about microlending"
[1]	INTR	"a convention in Chicago" [Error]
[2]	INTR	"Banks want to know more about it for the purposes of helping a few more poor people get out of debt or a nonprofit organization."
58	MICRO	"lend small amounts of money"
60	MICRO	"such as $100"
173	MACRO	"to a person, rather one of a group in a culture"
[3]	INTR	"in agriculture they can successfully"
168	MICRO	"to people who don't have any assets"
165	MICRO	"normally banks only lend to those with assets"
104	MICRO	"Grameen [Bank]"
67	MICRO	"makes loans to many poor people"
190	MICRO	"find only 3% of defaulting loans"
191	MICRO	"very low"
[4]	INTR	"the convention was in Chicago"
157	MICRO	"the concept of if it can work"
107	MICRO	"in places like Bangladesh"
106	MICRO	"and Bolivia"
208	MICRO	"it can work in the U.S."
69	GLOBAL	"to help people set up businesses in poor areas, to people without collateral"
210	MICRO	"nonprofit"
179	MICRO	"to lend to a group of people, each is responsible for the other person"
133	MICRO	"belong to the bank"
135	GLOBAL	"to help up to 100 million people by the year 2005"
134	MICRO	"The Convention hopes institutions are ready for this type of loaning
[5]	INTR	"The groups of people concerned about poverty in developing countries have had their own challenges, this is finding the best way to help"

Brenda's Recall Totals: 2 GLOBAL, 1 MACRO, 18 MICRO

Despite not recalling the main idea, Brenda did recall many other important ideas from the passage and many details as well. However, the main idea was a caution on the other ideas. Brenda may have awareness of this in her comment "finding the best way to help"[INTR 5].

Brenda's Model of the Situation on Passage 2 (Brenda - MS2). Brenda's model of the situation (Brenda - SM2) revealed that she had constructed an effective, higher level of interpretation of text. As shown in Table 34, despite not recalling the main idea and having weak prior knowledge, she evaluated microlending as a "paradigm shift", a solution to the "problem" of poverty and a more "risky way" or solution. She synthesized that microlending was "a global effort" using businesses and women to solve the problem. Brenda's mental model revealed that she had also analysed that the passage was about "innovative" ways of doing this. She inferred microlending was like the "co-op idea" in helping small businesses without capital to start up. Despite lack of resources, not recalling the main idea and having weak prior knowledge, Brenda was able to interpret the passage at higher, evaluative level of comprehension anyway.

Brenda's Reading Strategies and Awareness (Brenda - RS). Brenda read as she said she did as shown in Table 47. She identified the main points on Passage 1 (GLOBAL 18, 297, MACRO 54, 254) as she said she had, including the main idea. Brenda also identified text details as she said she had, recalling 12 micropropositions. She seemed to reread and visualize the text message as she had reported, although her visualization was difficult to ascertain. Brenda had strong prior knowledge of this topic and was aware of how she read and compensated for difficulties. Brenda seemed more at ease reading Passage 2 despite having weak prior knowledge of the topic. Again, Brenda largely read as she reported, using strategies that helped her interpret rather than recall the text, for example identifying bias and key words. She also knew she had word level difficulty, and that she had to sub-vocalize challenging words in order to decode and understand them. Brenda identified bias, as she said she had. She also reported using a unique coding strategy "to sort it out in my head", with which she was able to identify and remember text main ideas. In later interview she described the code as a "kind of shorthand" she had developed to reduce the quantity of reading she had to carry out in her profession as she was a slow reader "it takes me twice as long (as my colleagues)." Brenda said she remembered things in "images. I have a visual memory." (Brenda - RS) On both passages

Table 34

Brenda's Model of the Situation on Passage 2

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Evaluative	"a new paradigm, the old doesn't work - a paradigm shift"
	"Looking at more risky ways, more innovative ways of overcoming this problem"
Synthesis	"It suggests to me there is a fairly large group of people genuinely interested in solving the issue of poverty - not just in a small community but globally"
	"not with charity or by big business companies but people helping people including and often women"
Analysis	"group looking at innovative ways of doing something about poverty - a coop idea"
	"(Microlending) - success in setting up small businesses with now access to money to start with, which of course helps, to overcome poverty"

Table 35

Brenda's Reading Strategies on Passage 1 and 2

STRATEGY	WHAT SHE SAID SHE DID	CONGR-UENCE	WHAT SHE DID
Identify Main Points	"(Details) are lower priority for me than the content of the statement - ideas, concepts" (P 1)	YES	Brenda recalled 4 macrostructural propositions (GLOBAL 18, 297, MACRO 54, 254).
	"I read for content, ideas" (P 2)	YES	Brenda did identify 3 main ideas (GLOBAL 69, MACRO 173 and MACRO 135).
Identify Details	"I scanned for names and facts" (P 1)	YES	Brenda recalled 12 micro-level details
Visualize	"I have a visual memory of facts, of meaning. I close my eyes and see images" (P 1)	YES	Brenda did take off her glasses, rub then close her eyes twice.
Re-read	"Mostly I read sentence by sentence, when I couldn't understand I had to go back and reread it" (P 1)	YES	Brenda did reread sections of text.
Identify Bias	"I noticed that I knowingly in advance asked myself questions about my views of cloning"(P 1)	U/K	-
	"I try to find out what is behind this article, why this article?" (P 2)	YES	In her situational model, Brenda stated there were"a fairly large group of people who are genuinely interested in solving the issue of poverty"
Key Words	"I look for code words to sort it out in my head" (P 2)	U/K	-
Sub-vocalize	"I read (difficult words) to myself" (P 2)	YES	Brenda read some words softly to herself several times.

Brenda seemed aware of how she read, of her difficulties and of compensating for them.

On Passage 1, Brenda's textbase memory (Brenda - TBM1) showed she remembered the main idea of the text and her model of the situation(Brenda - SM1) revealed a higher, synthesis level of interpretation. Her strong prior knowledge may have aided her comprehension of the text, as shown in the inferential intrusions she made during recall, but it also made her cautious of believing the text information, which inhibited her in interpreting Passage 1. On Passage 2, although she did not recall the main idea (Brenda - TBM2), and had only weak prior knowledge of microlending. Despite this, she was able to infer additional information during recall and to use these building blocks to construct a higher evaluative model of the situation. Interestingly, like Jeffrey, strong prior knowledge prevented Brenda from recalling the first, cloning passage. As a family physician who delivered babies and counselled couples on fertility issues, this may have been a controversial issue. This may also relate to the emotive nature of the cloning topic, particularly since there has been a local media debate on the topic.

CASE STUDY OF MARGARET

Margaret is a 52-year-old researcher and teacher who counsels and advocates for disabled and abused children. She is married with one teenaged child. Margaret feels that one positive aspect of having a disability, is developing "skill in listening and sensitivity around people, one on one. Committees are not easy for me." She is inspired by the "innocent courage of children" she works with, and by her husband's "appreciation of myself, the way I am, the gifts I have."

In elementary school, Margaret experienced extreme difficulty in learning to read and write. She was raised by a nanny and received no support from her working parents "my childhood was sad and lonely despite growing up in a U.S. city surrounded by a large immigrant family. You see, I was the outsider, a non-reader in an educated family." In high school, Margaret had severe, persistent reading and writing difficulties, but "I excelled, I got through by cheating yet I always thought I was going to fail. It was frightening not being able to read." Margaret was identified LD in university. Student services helped her in both undergraduate and postgraduate study. "I avoid writing, I prefer to use the computer. Reading is still difficult and feels like a put-down to me. As reading dependent as my adult life now is, I still hate it." She has motor problems in writing and uses tri-focal glasses to see. Improving contrast between print and paper helps her. "It takes me twice as long as anyone else to read. It causes me such anxiety that I don't read right. It all comes out wrong." "I read aloud to myself sometimes, hearing it helps me to remember it. I might reread it. Sometimes I just throw up my hands and ask someone what the hell it is about." Margaret avoids reading "I prefer talking, a verbal explanation, let someone tell me what it is about - then I don't have to read it." She has developed some strategies to cope. "If I have to read something, I have a fancy scanning process of picking out key words and creating meaning."

Margaret prefers to learn by listening, "I have a fairly good auditory memory, I listen carefully, but academic tapes put me to sleep." Hands-on experience and visual diagrams help her, "I like maths, science, cooking, pragmatic things. I love details, fitting in the pieces. I am inspired by my imagination and solving problems. It is a very private thing." Margaret stated that she must be rested and in good health for optimal reading and writing performance.

Margaret's Text-base Memory on Passage 1 (Margaret -TBM1). As shown in Table 36, Margaret recalled the main idea of the text "scientists and theologians now speak to each other" (GLOBAL 297) and one Level 3 macroproposition "it focuses on moral and ethical issues around cloning" (MACRO 73). Her textbase memory included 11 micropropositions also such as "the little sheep" (MICRO 38) and "cloning of a dying child" (MICRO 270). Although Margaret recalled little of the macrostructure of Passage 1, she did recall the main idea and one supporting idea to aid her interpretation of the text.

However, it was the eight intrusions that Margaret made during recall that provided a window on how she constructed, in her own words "created," her textbase memory. Four of Margaret's intrusions showed that she had metacognitive awareness of her own meaning construction and of her affective response to the passage "I don't quite understand some of the stuff" [INTR 3], "I don't understand cloning and this didn't help me understand it also I wasn't sure that some of the statements made about some of the religions were necessarily accurate" [INTR 7], "I like the last line that said"[INTR 6] and "it gave me lots of fantasies about cloning that I had not thought of" [INTR 1]. Another four intrusions showed her use of inference to generalize text ideas "less well-known religions are being represented accurately - it is a nice thought" [INTR 8], "those scientific things you either like or not"[INTR 4] and elaborate text ideas "dying children replacing dying children "[INTR 2] and "you redo your life and you end up doing your life in exactly the same way - you end up with two deaths instead of one" [INTR 5]. Margaret had weak prior knowledge of cloning but "strong interest in the topic" "which stimulated my thinking." Nonetheless, Margaret recalled the main idea of Passage 1. Her intrusions showed she was very aware of her own understanding and that she used inference to overcome gaps in understanding.

Margaret's Model of the Situation on Passage 1 (Margaret - MS1). As shown in Table 37, Margaret had an affective response to the passage, "I have some slightly negative ideas about cloning myself", suggesting that "it is a horrific kind of thing for the whole world." Despite saying that she was "trying to find the positives (in cloning)", Margaret's interpretation of the text appeared to be mostly a personal, and a negative, one as shown in her use of the word "I" eight times and "me/myself" three times, and in her use of words like "horrific" and "dread."

Table 36

Margaret's Textbase Memory on Passage 1

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
2	MICRO	"It is about cloning"
51	MICRO	"and some of the controversies are created or it has highlighted"
38	MICRO	"that little sheep"
41	MICRO	"in Scotland"
73	MACRO	"It focuses a lot on the moral and ethical issues around cloning"
239	MICRO	"about the potentialities of cloning"
[1]	INTR	"and for me it was kind of nice because it gave me a lot of fantasies (about the potentialities of cloning) that I had not thought of"
[2]	INTR	"I don't quite understand some of the stuff but"
[3]	INTR	"dying children replacing dying children "
269	MICRO	"that is replacing dying children (with clones)"
270	MICRO	"cloning of a dying child"
[4]	INTR	"those scientific things you either like or not"
[5]	INTR	"you redo your life and you end up doing your life in exactly the same way.. you end up with two deaths instead of one"
[6]	INTR	"I like the last line that said"
297	GLOBAL	"scientists and theologians now speak to each other"
295	MICRO	"that was a good side effect"
[7]	INTR	"I don't understand cloning and this didn't help me understand it and I wasn't sure that some of the statements about some religions were necessarily accurate"
255	MICRO	"Catholicism bans"
259	MICRO	"reproductive technologies in total, I think that there is/ are"
257	MICRO	"some constrictions on what is permissible but I don't think it is a total ban"
[8]	INTR	"the article implies, would make me think that the other religions are not maybe as popular, but the less well known are represented accurately - it is a nice thought."

Margaret's Recall Totals: 1 GLOBAL, 1 MACRO, 11 MICRO

Table 37

Margaret's Model of the Situation on Passage 1

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Evaluative	"but mass production of anything, fertility the risk of losing imagination he aesthetics of our life/ life in a general sense, gets lost in the shuffle"
Synthesis	"It (the text) gave me conceptual learning rather than concrete things" "I learned from it that there are these other avenues about cloning that I had not thought about" "yet I can see if you had a perfectly structured horse how developing a clone of that horse would be of benefit in some way"
Affective	"I have some slightly negative ideas about cloning myself.. I was trying to apply positive to the processes" "it is a horrific kind of thing for the whole world. I dread it might become an industry"

Margaret synthesized that the text "gave me other avenues about cloning" to think about and "conceptual learning", which perhaps was an attempt to find positive aspects to cloning. She used the analogy of a thoroughbred horse, "yet I can see if you had a perfectly structured horse how developing a clone of that horse would be of benefit" to infer the potential positive use of cloning. However, her affective interpretation "I dread it might become an industry" would seem to indicate that the idea of human cloning appalled her, a strong affective response to the topic.

Margaret's Textbase Memory on Passage 2 (Margaret - TBM2). Margaret stated she had strong prior knowledge of Passage 2. Interestingly, despite this, she did not recall the main idea of the passage nor any other propositions from the macrostructure of the text, although she did recall seven micropropositions such as "it is about microbanking, microlending" (MICRO 1) and "lending someone a small loan" (MICRO 220).

As shown in her textbase memory in Table 38, Margaret did seem to read as she described in the interview - that is, "creatively." Despite recalling only a few details from the passage, she interwove a lengthy, analogous inference related to "an Indian guy" [INTR 1] from a previous experience she had "years ago." She used her analogy to infer specific association "this (loan process) is a little bit more formal (than that one), having a group to ensure they repay" and general association such as "this article is about how that concept has expanded all over the world" and "local people kind of make the decisions (about loans to small businesses)" [INTR 1]. Margaret's intrusions also revealed that she was aware of her own process, stating when she was finished "that is all" [INTR 3]. She also used the analogy of betting on horse races to explain how she thought microlending or giving those in poverty small loans, was unlikely to have a positive outcome "I can't picture how one could get out of a Chicago slum (with $100) unless I put in on the horses" [INTR 2] despite acknowledging that her encounter with the worker had shown her development projects could work. These recall intrusions showed that Margaret used inference to close gaps in her understanding of Passage 2 and to interpret the text through the framework of her previous encounter with an aid worker. Not recalling the main idea of Passage 2, she was unaware of the author's caution on the microlending process. Having prior knowledge and experience of meeting someone who did similar development work, did not help her to recall Passage 2.

Table 38

Margaret's Textbase Memory on Passage 2

PROPOSITION		SUPPORTING STATEMENT
NUMBER	LEVEL	
1	MICRO	"It is about microbanking, microlending"
157	MICRO	"which is a banking concept which came out of the East"
[1]	INTR	"Many years ago I heard an Indian guy talking about this and he had a bicycle and he was a microbanker. He went down to the bush and loaned money to people to buy machinery, to get their own wool carding from machines ... and he would loan people $10 and $5 ... and had wonderful experiences and lots of profit came in from people he backed ... and it was very exciting. I always wondered about it going into industrialized society and how it would work. This is an article about how that concept has expanded all over the world. So it was kind of neat to see that it has to do with loaning very small bits of money to collective groups and I think that it is a new kind of concept. This guy was very clearly loaning to individuals and he knew the communities and ... the individuals were reliable and he evaluated their projects himself. So it is a little bit more formal than having the notion of the group to ensure they repay and the legitimacy is also an interesting twist to it rather than having a person, of having local people kind of make the decisions"
200	MICRO	"it comes from an international conference of people who were into microlending as well as interested in"
109	MICRO	"113 countries"
218	MICRO	"[getting a loan to set up a small business] to get out of the Chicago slum"
220	MICRO	"lending someone a small loan."
60	MICRO	"a hundred bucks"
[2]	INTR	"I can't really picture how one could get out of the Chicago slum because of someone lending me a hundred bucks unless I put it on the horses and I don't know the group wouldn't agree to that kind of borrowing money - because of the track."
[3]	INTR	"That is all."

Margaret Recall Totals: 0 GLOBAL, 0 MACRO, 7 MICRO

Margaret's Model of the Situation on Passage 2 (Margaret - SM2). Table 39 shows Margaret's model of the situation of Passage 2. Despite not recalling the main idea, Margaret had strong prior knowledge and constructed a model of the situation that showed a high level of interpretation. She evaluated microlending as a "good plan" compared to cloning and one that had "energy" and was "creative." She synthesized that the passage showed the plan she heard of before, had "spread all over the world" and that there was "some commitment at some level" to make impoverished peoples independent. Margaret appeared to use her prior experience of hearing about the "Indian guy's" activities to help her both recall and interpret the passage. And it did seem to aid her interpretation. Despite poor recall of text macrostructure, she interpreted the text effectively.

Margaret's Reading Strategies and Awareness (Margaret - RS). Margaret had some awareness of how she read, as shown in Table 40. She reported that she identified key words and sub-vocalized challenging words and appeared to do so to some extent. It was unknown if Margaret had slowed to focus or re-read to improve her understanding, as she thought she had. These strategies may have helped her recall the main idea and construct an evaluative interpretation of the passage despite having weak prior knowledge. On Passage 2 Margaret had strong prior knowledge but did not recall the main idea as she thought she had since she recalled instead her experience with an Indian aid worker (Margaret - SM2). Margaret's efforts were effective and she constructed a higher level interpretation. She used her prior knowledge as she said she had. Margaret was unique among the group in her creative use of inference to both recall and interpret text. Overall, Margaret has some awareness of how she reads and compensates for difficulty.

Margaret said she was very nervous but was able to interpret both texts at higher, evaluative level. The way she did so varied over the texts. She also used strategies to help her read and had some awareness of this activity. On the first passage, she had an affective response to the cloning topic that may have helped her to overcome low prior knowledge and recall many micropropositions as well as the main idea (Margaret - TBM1). Margaret was also able to overcome lack of building blocks for her mental model, and construct a higher level situational model. Her strong interest in the topic may have helped in this. On the second

Table 39

Margaret's Model of the Situation on Passage 2

LEVEL OF INTERPRETATION	SUPPORTING STATEMENT
Evaluative	"It is a good plan, it is better than cloning"
	"that it [microlending] is creative and has a lot of energy"
Synthesis	"It suggests that thing I heard many years ago is indeed a good plan and that it has spread all over the world"
	"that there is some commitment at some level or another to develop ways to help impoverished people to help themselves"

Table 40

Margaret's Reading Strategies and Awareness on Passages 1 and 2

STRATEGY	WHAT SHE SAID SHE DID	CONGR-UENCE	WHAT SHE DID
Slow down and Focus	"I have to cope with the anxiety to begin with, talk to myself, or I cannot see the words. Then read slowly, I have trouble with my eyes" (P 1)	U/K	-
Re-read	"I shift backwards and reread the sections of the sentence, lots of times in what seems like one reading" (P 1)	U/K	-
Key Word	"I look at the key word, pick out the content between the fat triangle of the key words - I am good at picking those out without actually reading." (P 1)	YES	She recalled "cloning" and supporting idea "It focuses a lot on the moral issues" (MACRO 73)
Sub-vocalize	"I say the words to myself. I have a fairly good auditory memory" (P 1)	YES	Margaret repeated some key ideas to herself while reading the text, which she later recalled.
Identify Main Idea	"I study backwards to find the main idea" (P 2)	NO	-
Use Prior Knowledge	"I was bouncing it against prior knowledge, if you gave me a text I didn't know about I would have a terrible time" "Prior knowledge probably organised things for me" (P 2) "I made sense out of the passage in relations to what I knew about microlending." (P 2)	YES	Margaret's analogy of the "Indian guy" [INTRUSION

passage, she inferred a specific instance of an associated memory instead of recalling the text, although she did recall some supporting details. She used this additional information to construct her textbase memory and to provide building blocks that helped her to construct a higher level interpretation of the text. She did not recall any of Passage 2 macrostructure and was able nonetheless, to interpret it effectively. Margaret recalled many details from both passages, and little macrostructure, which may be indicative of her reading difficulty.

SECTION 2: INTER-CASE ANALYSIS AND INTERPRETATION

HIGHLIGHTS FROM THE DATA

In order to address the research questions and attempt to identify reader compensatory processes and strategies, the performance of participants in this study will now be examined and the research questions discussed from several different perspectives. This will be carried out in the following order:

(a) Inter-case analysis of textbase memory.

(b) Inter-case analysis of model of the situation.

(c) Inter-case analysis of intrusions.

(d) Summary of inter-case results related to Research Question 1.

(e) Summary of inter-case reader awareness related to Research Question 2.

(a) Inter-Case Analysis of Textbase Memory

Readers within the group of eight participants varied considerably in how many main ideas or global propositions they remembered after reading the texts. They also varied in how much prior knowledge they brought to the tasks and in their use of inference and metacognition.

Passage 1. As shown in Table 41, only four readers recalled "cloning has opened a debate between scientists, philosophers and theologians" (GLOBAL 297), the Level 1 global proposition and main idea of Passage 1. These were Keith (see Table 1), Belinda (Table 26), Brenda (Table 31) and Margaret (Table 36). The other four readers, Graeme, Jeffrey, Jack and Natalie did not recall the main idea. As well, six readers, Keith, Graeme, Jack, Belinda, Brenda and Margaret recalled at least one Level 2 main idea or global proposition out of a total of five global propositions. One of these readers, Brenda, managed to recall three global propositions, including the main idea. But Graeme and Jack did not recall the main idea. Jeffrey had strong prior knowledge of cloning and did not recall any global propositions, or main ideas of the passage (see Table 11). Natalie had weak prior knowledge and also recalled no main ideas

Table 41

Inter-case Textbase Memory on Passage 1

CASE	GLOBAL	MACRO	MICRO	MAIN IDEA (GLOBAL 297)	PRIOR KNOWLEDGE
Keith	1	2	12	Y	S
Graeme	1	0	14	N	W
Jeffrey	0	4	4	N	S
Jack	1	0	6	N	W
Natalie	0	3	9	N	W
Belinda	1	2	13	Y	S
Brenda	3	1	12	Y	S
Margaret	1	1	11	Y	W

*Textbase Totals: 5 GLOBAL, 31 MACRO, 26 MICRO

(Overall number of propositions in text - 297)

+KEY: Main Idea Y = yes, N = no;

Prior Knowledge S = strong, W = weak.

(Table 21). Keith, Jeffrey, Natalie, Belinda, Brenda and Margaret recalled at least one Level 3, macroproposition out of a total of 31 macropropositions in Passage 1. Despite not recalling the main idea, Jeffrey recalled the most macropropositions, that is he recalled four. Graeme and Jack did not recall any. Everyone remembered details from the text. All readers recalled at least 4, and as many as 13, micropropositions. Jeffrey recalled the least number of micropropositions (four) and Belinda recalled the most (13). Five out of the eight readers recalled at least 10 micropropositions.

While E. Kintsch (1990) suggested that recall efficiency relates to the amount of text macrostructure that the reader remembered. It would appear from inter-case data as shown in Table 41, that recall of the main idea related less to the number of propositions recalled than to the position of recalled propositions in the text's semantic propositional hierarchy. All macropropositions were not equal as shown in the template textbase in Appendix 4. There were three levels of macropropositions. The Level 1 proposition was the main idea. For example, Jeffrey recalled four macropropositions and did not recall the main idea while Margaret recalled two and did (Table 36). The difference between the two performances is that Jeffrey recalled four Level 3 macropropositions, while Margaret recalled the Level 1 global proposition that was the main idea, as well as one other Level 3 macroproposition. Other readers who recalled the main idea including Keith, Belinda, Brenda, all recalled the Level 1 global proposition (GLOBAL 297), the main idea and varied in what else they recalled. Keith recalled only two other macropropositions, as did Belinda. Brenda recalled two other global propositions as well as one Level 3 macroproposition. Even readers who did not recall the main idea were able to recall some of the text macrostructure. Graeme and Jack both recalled a Level 2 global proposition and no Level 3 macropropositions, but did not recall the main idea. Natalie and Jeffrey were unable to recall any Level 1 or 2 global propositions, yet recalled three and four macropropositions respectively. They remembered supporting ideas, but not main ideas of Passage 1.

One factor that may have influenced reader recall, is the well-established "primacy and recency effect" (Ebbinghaus, 1929) in which readers remember information at the beginning and the end of a list of information, or the beginning and end of a text (Meyer, 1975). In Passage 1,

the main idea was situated in the last paragraph of the text. While this would appear to aid reader recall, the main idea required the reader to attend carefully to the fact that it was a new idea, that dialogue between science and moralists was a valuable outcome of cloning, rather than a restatement of ideas that had preceded related to the dilemma of the technology. Primacy-recency memory effect could help the reader to remember this information, but not to situate the information within the existing mental memory that he had already constructed.

Another factor from the LD literature, which could influence inter-case performance is reader utilization of limited memory capacity. The limited capacity theory proposes that readers using cognitive resource to hold micro-level information within short-term memory, would have limited capacity available to retain and process macro-level information. This was not the case. All four subjects who recalled the main idea of Passage1, also recalled between 11 and 13 micro-level propositions as well. Although four readers, Graeme, Jeffrey, Jack and Natalie also recalled between four and 14 micropropositions, they did not recall the main idea. Using cognitive resource to maintain micro-level information in memory, may have impaired their ability to recall the main idea. Since Graeme, Jack and Natalie also had weak prior knowledge as well, these readers had little resource for remembering the text main ideas and little available information with which to infer information and close gaps in comprehending the text. They were twice disadvantaged. Jeffrey was different in that he chose to maintain his bias while recalling the passage and was aware it would "slant my interpretation" (Table 11). Margaret recalled 11 micropropositions, only one global and one macroproposition, had weak prior knowledge and was able to overcome this and recall the main idea (Table 36). Perhaps the ability of these able readers to chunk information in short term memory efficiently, has helped them to overcome the loss of cognitive capacity that may occur when an individual uses his resources to remember many low-level details, or perhaps the details are seductive and capture his attention, which in turns helps him to remember. Limited capacity theory may be easier to prove with young readers than with older competent readers.

Again, while prior knowledge was an important resource in the literature to aid readers in making sense of text, main idea recall as shown in Table 41, did not depend in this study upon strong prior knowledge. For Jeffrey, strong prior knowledge appeared to underpin his strong

affective reaction to the cloning topic that actually prevented him from remembering Passage 1 efficiently. Although Keith, Belinda and Brenda also had strong prior knowledge and recalled the main idea, Margaret, on the other hand, had only weak prior knowledge and recalled the main idea despite lack of associative memory. But Graeme, Jack and Natalie, who also had weak prior knowledge, were unable to overcome lack of resources, and did not remember the main idea.

In summary, individual readers varied in how they recalled Passage 1. Recalling many propositions from text macrostructure, having strong prior knowledge, not using up memory capacity in recall of low, micro-level information may have helped some readers to recall the main idea of Passage 1, but others were able to do so without all of these resources. For example Margaret recalled only 1 global and one macro-level proposition, had weak prior knowledge, recalled 11 micropropositions and yet was able to recall the main idea. Jeffrey who did have strong prior knowledge, recalled four macropropositions, and only remembered four micro-level propositions yet did not recall the main idea. As shown in Table 41, there was considerable diversity in how individual readers constructed their textbase memory and no typical performance. All readers did though, retain some of the text microstructure that would not help in remembering the main idea(s) of the text and may be indicative of their disability. Each reader interacted with Passage 1, retained propositions from the macrostructure of the text and overcame comprehension difficulty in their own unique way.

Passage 2. As shown in Table 42, only three readers, Graeme (Table 8), Jeffrey (Table 13) and Jack (Table 18), recalled the main idea of Passage 2 and five readers did not. Graeme, Jeffrey and Jack differed in how they constructed their textbase memory, although one resource these readers had in common was strong prior knowledge of the microlending topic, which may have helped them to recall the main idea. However, Margaret who also had strong prior knowledge but did not recall the main idea (Table 38). The four readers who did not recall the main idea, Keith, Natalie, Belinda and Brenda, all had weak prior knowledge.

Only four readers, Graeme, Jeffrey, Jack and Brenda, were able to recall global propositions from the textbase of Passage 2. Of these, only Graeme, Jeffrey and Jack recalled the main idea "Microcredit, as a means of attacking poverty at its roots, may fail if future expansion lacks the essential qualities of the original model" (GLOBAL 299). Brenda did not, despite

Table 42

Inter-Case Textbase Memory on Passage 2

SUBJECT	GLOBAL	MACRO	MICRO	MAIN IDEA	PRIOR KNOWLEDGE
Keith	0	1	14	N	W
Graeme	3	2	23	Y	S
Jeffrey	1	2	15	Y	S
Jack	1	1	9	Y	S
Natalie	0	2	9	N	W
Belinda	0	2	10	N	W
Brenda	2	1	18	N	W
Margaret	0	0	7	N	S

*Textbase Totals: 4 GLOBAL, 26 MACRO, 267 MICRO (Overall number of propositions in text - 297)

+KEY: Main Idea Y = yes, N = no;
Prior Knowledge S = strong, W = weak.

recalling two other global propositions (Table 33). Graeme recalled three out of the total of four global propositions from the passage, including the main idea.. Jeffrey and Jack each recalled one global proposition, the main idea. Other readers did not recall any global propositions, or main ideas from Passage 2, although all but Margaret were able to recall Level 3 macropropositions, or supporting ideas.

The eight participants all recalled between 7 and 23 micropropositions. Micro-level recall did not seem to hinder readers from remembering the main idea though. Graeme for example, recalled 23 micropropositions yet recalled the main idea and two other global propositions (Table 8). Similarly, Jeffrey recalled 15 and Jack recalled 9, micropropositions yet recalled the main idea. All of these readers had strong prior knowledge. Margaret who also had strong prior knowledge recalled 7 micropropositions, but no macro or global propositions and was unique in her performance (Table 38). Like Jeffrey on Passage 1, she was aware of doing so.

Keith, Natalie, Brenda and Belinda, but not Margaret, had some performance characteristics in common. They recalled the main idea, had low prior knowledge, recalled a few Level 3 supporting ideas, but no main ideas, and also recalled several low-level details. For example Natalie recalled 2 macro and 9 micro-propositions from Passage 2. She had weak prior knowledge and did not recall the main idea. Margaret was unusual in the group in recalling only 7 micropropositions despite having strong prior knowledge. In order to analyse how she constructed meaning, it is necessary to examine her recall intrusions and this will be carried out in the discussion related to the effects of intrusions.

As on Passage 1, there was no typical performance, with Margaret again as the outlier. However on this passage it would appear that prior knowledge facilitated, and lack of prior knowledge impaired, recall. There would appear to be a greater difference in performance between the resources and performance of readers who did/ and readers who didn't recall the main idea on this passage than on Passage 1. Those who did not recall the main idea, recalled very little of the main ideas of the passage, remembering only a couple of ideas and many details. Those who did retained more of the main passage ideas. Margaret did not fall into either category.

No reader remembered the main idea of both passages. Natalie did not recall the main

idea of either passage. Natalie was the youngest of the group and the only participant who had not completed her undergraduate degree (Table 23). Also, she did not report strong prior knowledge of either topic. Perhaps her recall performance would be different when reading a familiar text. The other seven readers remembered the main idea of one or either passage, usually the one for which they self-reported strong prior knowledge. Margaret (Table 38) was the exception to this, since she recalled the main idea of the passage for which she had weak prior knowledge and did not recall the main idea of the passage for which she had strong prior knowledge. That is, readers tended not to recall the main idea of unfamiliar text. Prior knowledge was an important factor in recall performance.

The above inter-case data would appear to confirm that compensated readers tended to remember low-level propositions, even from text for which they have strong prior knowledge, much like E. Kintsch's (1990) poor readers. In the pilot study (Egan, 1991) NLD readers tended to remember two or three micropropositions at the most, from passages they had read. Micropropositional recall may be therefore indicative of persistent reading problems.

(b) Inter-Case Analysis of Model of the Situation

Passage 1. As shown in Table 43, individual readers varied considerably in how they interpreted Passage 1 and what resources they had to help them. Apart from Jeffrey, who adopted and was aware of adopting a bias in his interpretation, all were able to interpret the passage successfully irrespective of the resources and processes they used to construct their situational model.

Keith (Table 2), Jack (Table 17), Natalie (Table 22), Belinda (Table 27) and Margaret's (Table 37) situational models showed that they interpreted text at the highest evaluative level. Of these readers, Keith, Belinda and Margaret recalled the main idea. Jack and Natalie did not, but were able to interpret at evaluative level anyway. Keith, Graeme, Jack, Belinda, Brenda and Margaret interpreted Passage 1 at the synthesis level. Of these readers, Keith, Belinda, Brenda and Margaret recalled the main text idea. Graeme and Jack did not but were able to interpret at the synthesis level anyway. Graeme, Jack, Natalie and Brenda also interpreted at a lower, analysis level of interpretation. Of these readers only Brenda had recalled the main idea and the others had not. No one interpreted the text at a literal level on this passage. Keith, Graeme,

Table 43

Inter-Case Model of the Situation on Passage 1

LEVEL OF INTERPRETATION*	INDIVIDUAL CASE							
	K	G	Je	Ja	N	Be	Br	M
High Levels								
Evaluative - evaluates worthiness of text message within own world knowledge	✔	–	–	✔	✔	✔	–	✔
Synthesis - puts together explicit and implicit text information into coherent mental model	✔	✔	–	✔	–	✔	✔	✔
Low Levels								
Analysis - analyses text information critically within own world knowledge for strengths and weaknesses	–	✔	–	✔	✔	–	✔	–
Literal - interprets explicit text message without critical reflection	–	–	–	–	–	–	–	–
Affective Level								
responds emotionally to text message positively or negatively	✔	✔	✔	–	–	✔	–	✔

Key ✔ denotes interpretative level of the model of the situation

Jeffrey, Belinda and Margaret had an affective reaction to the text. For example, Margaret found the topic "horrific" and stated that she "dread(ed)" the future of cloning (Table 37). This may have engaged her attention in making sense of the passage. Of those with an affective response to the text, Keith, Belinda and Margaret recalled the main idea and may have been aided by their reaction to the text. Graeme and Jeffrey did not recall the main idea. Graeme was able to interpret at higher synthesis level and his affective reaction may have helped him (Table 7). Jeffrey was unable to overcome his recall bias and affective response, despite strong prior knowledge and did not interpret at higher interpretive levels, although he chose to do so "I have my own slant on this" that he acknowledged would influence his performance (Table 12).

Passage 2. On this passage, all eight readers were able to interpret the text at a higher level of interpretation, that is either at evaluative or synthesis level, as shown in Table 44. Six readers, including Graeme (Table 9), Jeffrey (Table 14), Jack (Table 19), Natalie (Table 24), Brenda (Table 34) and Margaret (Table 39) interpreted the passage at higher, evaluative level. Graeme, Jack and Jeffrey recalled the main idea and strong prior knowledge that may have helped them to interpret the text at this level. Margaret had strong prior knowledge also, but did not recall the main idea. Brenda did not have strong prior knowledge. Keith, Graeme, Jeffrey, Jack, Brenda, Belinda and Margaret interpreted text at synthesis level. Graeme, Jeffrey, Jack and Margaret had strong prior knowledge to help them, and all except Margaret recalled the main idea as well. Keith, Brenda and Belinda did not recall the main idea and had only weak prior knowledge but were able to interpret at this level anyway. Keith, Jeffrey, Jack, Belinda and Brenda also interpreted at lower, analysis level. Keith alone, interpreted at a literal level. Three readers had an affective response to the text topic. These include Keith, Natalie and Belinda. Of these, only Natalie interpreted at higher evaluative level, and the others at higher synthesis level. All three of these readers had weak prior knowledge and did not recall the main idea. For these readers, having a positive affective response to the topic, they liked the idea of microlending, may have aided interpretation of Passage 2. As on Passage 1, there was no typical performance of an effective reader on Passage 2 although there was a trend for prior knowledge, main idea recall and affective response to help readers in the group interpret at higher evaluative or synthesis level. But these resources were not necessary, as Natalie, Brenda, Belinda and Keith

Table 44

Inter-Case Model of the Situation on Passage 2

LEVEL OF INTERPRETATION*	INDIVIDUAL CASE							
	K	G	Je	Ja	N	Be	Br	M
High Levels								
Evaluative - evaluates worthiness of text message within own world knowledge	–	✔	–	✔	✔	–	✔	–
Synthesis - puts together explicit and implicit text information into coherent mental model	✔	✔	✔	✔	–	✔	✔	✔
Low Levels								
Analysis - analyses text information critically within own world knowledge for strengths and weaknesses	✔	–	✔	✔	–	✔	✔	–
Literal - interprets explicit text message without critical reflection	✔	–	–	–	–	–	–	–
Affective Level								
responds emotionally to text message positively or negatively	✔	–	–	–	✔	✔	–	–

Key ✔ denotes interpretative level of the model of the situation

succeeded without them.

Overall, it would appear that compensated readers are able to overcome textbase difficulties and successfully interpret text even when reading unfamiliar text. Some readers had many difficulties to overcome, such as weak prior knowledge and not recalling the main idea, in order to succeed. No one recalled the main idea of both texts, but everyone, apart from Jeffrey on Passage 1, was able to interpret both at a higher level. Interestingly, among the group, only Margaret and Natalie were able to interpret both passages at a higher, evaluative level. Yet both had textbase difficulties and weak prior knowledge of either or both texts. Natalie did not recall the main idea and had weak prior knowledge of both texts, yet succeeded (Table 24). Margaret interpreted Passage 1 successfully despite not recalling the main idea and having weak prior knowledge (Table 39). Her strong interest and affective reaction to the text seemed to help her. On Passage 2, Margaret did not recall the main idea despite strong prior knowledge, but succeeded in interpreting at a higher level. Margaret was unusual among the group in not recalling the main idea of a familiar passage, although Jeffrey did this on Passage 1 due to bias. There was no typical performance, individuals varied considerably in how they recalled and interpreted Passages 1 and 2. Nonetheless, apart from Jeffrey on Passage 1, all the readers in this study were able to overcome textbase difficulties and interpret both texts effectively. In order to find out how they did so and what strategies they used, it is now intended to examine the inter-case construction processes of readers in greater depth.

(c) Inter-case Analysis of Intrusions

Compensated readers used available resources such as prior knowledge and textbase recall, as building blocks to construct effective models of the situation of text. It is suggested that a window on the mental model construction process is provided by the recall intrusions made by individual readers as they sought to overcome any comprehension difficulties. Recall intrusions represent the kind of processes that Ericsson and Simon (1993) term "think aloud" and Braten terms (1991) "self talk" and reveal the problem solving processes readers use to gaps in understanding. They can offer a dynamic view of reader cognition on task, and a window on what Royer, Cisero and Carlo (1993) term the "transformation" process through which readers take or remember propositions from external text and transform them into their own internal

mental model. Royer et al further suggest that reader construction processes are a "diagnostic tool" for understanding disabled reading, a kind of dynamic assessment of reading ability. Intrusions made by all readers over the two passages were collated and common categories of information were found within the data. Appendix 3 contains examples of recall intrusions found in reader protocols over both passages. Inter-case reader intrusions will now be described within the context of reader recall and interpretation performance in order to find out how readers compensated for textbase difficulties and address the first research question.

Three broad categories of intrusions were identified including inference, metacognitive statements and errors. Errors found in reader protocols are taken as evidence of reader difficulties. Inference and metacognition may be evidence of compensation. Since the aim of the study is to identify compensation rather than disability, inference and metacognition intrusions only will be examined within reader comprehension processes. Errors have been discussed within the context of each individual reader's case study. Individual intrusions over both passages were coded and intra-group tables created to enable examination of their effect on reader textbase memory and mental models construction. Table 45 shows the effect of intrusions for each participant in comprehending Passage 1 and Table 46, for each in comprehending Passage 2.

Effects of Intrusions on Reader Performance on Passage 1. As shown in Table 45, the effects of intrusions on individual reading outcome differed considerably among readers and influenced both reader textbase memory and model of the situation construction. Keith, Jeffrey, Belinda and Brenda reported strong prior knowledge of the text topic, the rest reported weak prior knowledge. Readers made both inferential and metacognitive intrusions during recall. Keith, Graeme, Jeffrey, Natalie, Belinda and Margaret made inferential intrusions, which were either specific or general in nature. Jack alone did not make intrusions in constructing his textbase memory of Passage 1. Graeme, Belinda and Margaret made a specific inference(s), for example Graeme inferred "it (cloning) is possibly alright for animals but not for humans" [INTR 2]. Keith, Graeme, Jeffrey, Natalie and Belinda made a generalization inference(s), for example Keith (Table 1) inferred "it (cloning) really wasn't a big problem" [INTR 1]. Only Graeme and Belinda made both kinds of inference, for example, Belinda inferred "different religious groups

Table 45

Inter-Case Effects of Intrusions on Reading Performance on Passage 1

Categories	Individual Cases							
	K	G	Je	Ja	N	Be	Br	M
PRIOR KNOWLEDGE (S = strong W = weak) :								
Level of prior Knowledge	S	W	S	W	W	S	S	W
RECALL PERFORMANCE (Y = yes N = no) :								
Recalled main idea	Y	N	N	N	N	Y	Y	Y
Made inferential intrusion during recall	Y	Y	Y	N	Y	Y	N	Y
Made metacognitive intrusion during recall	N	Y	Y	N	N	N	Y	Y
EFFECT ON SITUATIONAL MODEL (Y = yes N = no) :								
Made reader infer specific related information from own general knowledge related text information.	N	Y	N	N	N	Y	N	Y
Made reader infer general related association from own knowledge of a specific instance.	Y	Y	Y	N	Y	Y	N	N
Made reader monitor own construction of meaning.	N	Y	Y	N	N	N	Y	Y
Made reader aware of own affective response.	Y	N	Y	N	N	N	Y	Y
OUTCOME (H = high L = low level of interpretation) :								
Level of Situational Model	H	H	L	H	H	H	H	H

look at this differently" [INTR 4] and "we are moving to be able to clone humans" [INTR 2] (Table 27). Graeme, Jeffrey, Brenda and Margaret, also made metacognitive intrusions, for example Jeffrey stated "that is the way I interpret it but I don't understand reincarnation not being from that culture" [INTR 2] (Table 11).

A full description of each reader's process can be found in the individual's case study. To address the first research question and identify how readers compensated for textbase difficulties, also to find out similarities and differences among individuals, it is intended to select the construction and compensatory processes of three readers and use this as a basis of comparison with the other readers. Margaret, Brenda and Jack have been selected. Margaret, who had weak prior knowledge of Passage 1, made many intrusions while constructing meaning, making her construction process more transparent than others, who did not appear to articulate all of their thought processes as readily. Brenda who had strong prior knowledge, also made many intrusions and her process was similarly overt. Jack on the other hand made no intrusions and his construction process was hidden or covert.

Margaret had strong interest in cloning despite weak prior knowledge. Her recall intrusions showed that she used inference and metacognition helped her to interpret text. Having recalled the main idea, for example, she inferred the additional, specific information that cloning involved "dying children replacing dying children" [INTR 3], which was not stated in the text, but which nonetheless seemed to elicit an affective response, found in her model of the situation (Table 37)). Margaret's response was that cloning was "horrific" and she inferred that "you redo your life and you end up doing your life in exactly the same way - you end up with two deaths instead of one." Margaret's recall intrusions also reveal that she had metacognitive awareness of her own understanding, "I don't quite understand that stuff" [INTR 2], "I don't understand cloning and this didn't help me understand it, also I wasn't sure that some of the statements made about some of the religions were necessarily accurate"[INTR 7]. Despite recalling 11 micropropositions and having low prior knowledge of Passage 1, Margaret was able to recall the main idea. Margaret also used inference, metacognition and interest in constructing her high level, evaluative model of the situation (Table 38). For example, she specifically inferred, "I can see if you had a perfectly structured horse how developing a clone of that horse would be of benefit in

some way" and monitored her own construction of meaning "I was trying to apply positive to the processes" (Table 38). She had an affective reaction and was metacognitively aware of this "I have some slightly negative ideas about cloning." Overall, Margaret's ability to monitor her own understanding may have helped to focus on important issues within the text, filter out irrelevant details and construct an effective interpretation. Her ability to infer additional information led to an affective response in her situational model, a greater interest in the cloning topic and perhaps a higher level interpretation of the passage. With these resources, she was able to comprehend the text and even assess her own learning "it gave me a lot of fantasies (about) the potentialities of cloning that I had not though of" [INTR 1] and "it gave me conceptual rather than concrete learning" (Table 38).

Brenda had strong prior knowledge. Her intrusions during recall (Table 31) showed metacognitive awareness of her own process "the statement I most remember" [INTR 1] and "which was very interesting"[INTR 2] and included a general inference "(cloning) is a stretch of the imagination" [INTR 1]. On this passage, Brenda recalled the main idea and two other global propositions as well as 12 micropropositions. Using building blocks of global propositions, inference and metacognition, she was able to construct a synthesis level interpretation of text "the largest concern - you can clone a lamb but there is difficulty in cloning humans, morally." Brenda recalled many of details from text (11 micropropositions) as well as main ideas. Her ability to monitor her own understanding helped her to not be distracted by irrelevant recall. Her ability to infer additional information helped her to situate text information (Table 32) within what she already knew, and to interpret the text message through the filter of her own knowledge and experience. Brenda used these cognitive resources to effectively model the situation of text.

Jack made no intrusions and if he inferred association or was aware of his own meaning construction, this was not revealed in his recall protocol (Table 16). He had weak prior knowledge of Passage 1 and did not seem to have an affective response to text. Jack did not recall the main idea, recalling instead only one global idea, and six micropropositions. His model of the situation (Table 17) contained no additional inferences or metacognitive statements and he did not have an affective response to the text. Within Enhanced Kintsch framework, his textbase memory did not contain any apparent building blocks of meaning such as the main idea,

or compensatory inferences from prior knowledge. Nor did Jack provide any verbal evidence of being aware and in control of his own process. Nonetheless, this covert construction process worked. Jack's model of the situation was as effective as Margaret's. Jack said he was very nervous and may have been reluctant to verbalize his construction processes. Perhaps, as Jack reported, he thinks about meaning in visual images, not words, and was unable to articulate his ongoing image construction. Jack was able to compensate for lack of prior knowledge and main idea recall, but he made no recall intrusions to uncover his compensation processes.

There were similarities and differences among the group compared to Margaret, Brenda and Jack in textbase memory construction, as shown in Table 45. Like Margaret and Brenda, both Keith and Belinda recalled the main idea of text. Also, like Margaret and Brenda, Keith, Graeme, Jeffrey, Natalie and Belinda made either an inferential or metacognitive intrusion during recall. Like Jack and Margaret but unlike Brenda, Graeme and Natalie had weak prior knowledge. Like Brenda, Keith, Jeffrey and Belinda had strong prior knowledge. That is, reader resources varied among the group. Intrusion effects on reader mental model also varied among individuals. Like Brenda and Margaret, Keith, Graeme, Jeffrey, Natalie and Belinda inferred information, monitored their own understanding or had an affective response to the text, while constructing a situational model. The outcome of this activity was that Keith, Graeme, Natalie, Belinda and Jack, like Margaret and Brenda, were all able to construct a higher level interpretation of text. Most readers were able to use resources available to them, to adjust or add to their mental model through inference and to be aware of the efficacy of their own process. Jack's compensation may have been like the other readers, but this was not apparent in his recall intrusions. He was an outlier in the group on this passage in that his construction processes could not be examined. There were also differences among readers in the effect of recall intrusions. Jeffrey was different from other readers having strong prior knowledge, making inference and metacognition intrusions but not interpreting text at a high level (Table 12). There was no intrusion evidence that Brenda and Jack used inference to help them construct an effective situational model. Many readers such as Keith, Jack, Natalie and Belinda did not reveal awareness of their own process, unlike Brenda and Margaret. Graeme, Jack, Natalie and Belinda did not report an affective response to the text.

Overall there was a trend of readers with strong prior knowledge to recall the main idea, and show in their intrusions that they had inferred additional information and been metacognitively aware of their own understanding. Jeffrey, who had very strong prior knowledge, did not conform to this trend. He did not recall the main idea although he was aware that his acceptance of his own bias would "slant" his interpretation of the passage. There was also a trend for those with weak prior knowledge not to recall the main idea, but to infer association and be aware of their own process, like those with strong knowledge. Margaret was the exception to this trend in having weak prior knowledge yet recalling the main idea, also inferring and being aware of her own process. In summary, there was no typical pattern of understanding Passage 1 among the eight participants. Readers were able to infer additional information if they had strong prior knowledge, but they were able to do so if they had not. Inference and metacognition helped readers to construct an effective recall and interpretation of the text, but some like Jack who did not appear to use these resources were able to do so anyway. Jeffrey, who had these resources, did not construct a higher level model. Most readers were aware of their own process and of compensating for difficulty.

Effects of Intrusions on Reader Performance on Passage 2. As shown in Table 46, there was also considerable diversity in the effects of intrusions on Passage 2. Readers again varied in the prior knowledge they brought to the task. Graeme, Jeffrey, Jack and Margaret had strong prior knowledge, while Keith, Natalie, Brenda and Belinda had weak prior knowledge. Readers also varied in the transparency of their reading process. Jeffrey revealed his use of inferential reasoning and metacognitive awareness in his intrusions. Keith on the other hand, revealed little. On this passage, all readers made inferential intrusions during recall and four made metacognitive intrusions. As working adults all had experience of bank loans. Readers unfamiliar with community development ideas like microlending, used their personal banking knowledge as a frame of reference. Others drew upon their knowledge of other aid programs. Inferential

Table 46

Inter-Case Effects of Intrusions on Reading Performance on Passage 2

Categories	Individual Cases							
	K	G	Je	Ja	N	Be	Br	M
PRIOR KNOWLEDGE (S = strong W = weak) :								
Level of prior Knowledge	W	S	S	S	W	W	W	S
RECALL PERFORMANCE (Y = yes N = no) :								
Recalled main idea	N	Y	Y	Y	N	N	N	N
Made inferential intrusion during recall	Y	Y	Y	Y	Y	Y	Y	Y
Made metacognitive intrusion during recall	N	N	Y	Y	N	Y	N	Y
EFFECT ON SITUATIONAL MODEL (Y = yes N = no) :								
Made reader infer specific related information from own general knowledge related text information.	N	N	Y	Y	Y	N	Y	Y
Made reader infer general related association from own knowledge of a specific instance.	N	Y	Y	N	Y	Y	Y	N
Made reader monitor own construction of meaning.	N	N	Y	Y	N	N	N	Y
Made reader aware of own affective response.	Y	N	N	N	N	N	N	Y
OUTCOME (H = high L = low level of interpretation) :								
Level of Situational Model	H	H	H	H	H	H	H	H

intrusions had the effect of providing readers with additional information to situational modelling process. There were two kinds of inferential intrusions. Firstly, some inferred specific related information. For example, Belinda (Table 29) inferred "(this is like) the problem of North American Indians because of the way the reserve system is set up, it sets up a cycle of dependency and welfare that we cannot seem to break"[INTR 1] and Jack (Table 19) inferred "we are involved in this stuff, moving them out of welfare onto workfare" [INTR 1], which had the effect of comparing his work to microlending and using this framework to interpret the text. Others inferred general related information, for example, Graeme inferred "there is a need to help people, this is another way of doing it, to get people out of debt responsibly" (Table 9).

Four of the eight readers made metacognitive intrusions during recall of Passage 2, which helped them to monitor their own meaning construction, for example Belinda made the statement "this is something I have heard about and it makes imminent sense to me" [INTR 1] that had the effect of helping her to compare her knowledge of banking and North American Indians to the text. For others, the metacognitive intrusions seemed to be a kind of self-talk, for example, Keith stated "I was a little suspect of it when I first started reading" (Table 4). Metacognitive intrusions also made readers aware of their own affective response, for example Keith also stated "though I guess it sounded like a pretty interesting idea" (Table 4).

As shown in Table 46, the outcome of this activity was the same for all readers. Everyone was able to construct a higher level interpretation of text. In order to examine intra-case trends and patterns, two readers, Jeffrey and Keith have been selected as prototypes and used as a basis of discussion for the group. Jeffrey had strong and Keith has weak prior knowledge of the text. Jeffrey made many and Keith, few intrusions.

Jeffrey had strong prior knowledge of Passage 2. During recall (Table 13), he inferred the generalization that "there is peer pressure" [INTR 2] in microlending, that "3% delinquent is not bad" [INTR 3] and that "the bank must have some equity to fall back on" [INTR 4]. He also inferred "using debt as a means of raising people out of their squalor is dubious" [INTR 5]. These inferences, derived from his work experience in banking, helped him to not only recall the main idea of the text, but also to start interpreting it at the same time during recall. Jeffrey's intrusions also showed he had metacognitive awareness of his own process "my understanding

from the article, the way these loans work" [INTR 1]. The effect of Jeffrey's intrusions on his situational model (Table 14), was that he inferred further associated information and revealed further awareness of his own interpretation. For example, he made the specific inference of "(my) work with C.I.D.A. and the concept of doing things at micro or grass roots level"(Jeffrey - SM2), which was derived from his experience in carrying out a community development project overseas. He made the general inference "this kind of process is a decline in aid, rather than handing out equity to people, now here is a loan" (Jeffrey - SM2). Jeffrey also showed he was monitoring his own understanding "I interpret this as similar to what was going on at work." The outcome of this activity was that Jeffrey recalled the main idea and interpreted the text at higher, evaluative level.

Keith on the other hand, had weak prior knowledge. He revealed little of his construction process in the intrusions he made during recall. Instead his recall intrusions (Table 3) included two errors "they had something like a 97% success rate in repayment"[INTR 1], which was a number reversal and "in the space of a year"[INTR 2], which was incorrect. These errors may have been indicative of difficulty rather than of compensation. He did not recall the main idea. The effect of these intrusions on his situational model (Table 4), interestingly was not adverse and they may have indicated his sustained effort in constructing meaning despite his difficulties. Keith's affective response in his model of the situation may provide a way of understanding how he overcame recall difficulties, in that he found microlending "was a pretty interesting" (Table 4) idea, directly relative to his own recent loan experience. Keith was able to interpret at higher, synthesis level.

Prior knowledge may have helped all readers since everyone made recall intrusions on this passage that showed both specific and general inference. Jack, Natalie, Brenda and Margaret, like Jeffrey, made specific inferences but Keith, Graeme and Belinda did not. For example, Jack inferred the microlending was "like workfare" [INTR 1]. Margaret's textbase memory was composed of one large specific inference to the "Indian guy" [INTR 1] and a few micro- level propositions. Graeme, Natalie, Belinda and Brenda, like Jeffrey made general inferences but Keith, Jack and Margaret did not. For example, Jeffrey (Table 13) inferred that

microlending was a "dubious way and short-term (solution)" [INTR 5] in helping the poor. Prior knowledge may also be linked to metacognitive intrusions that helped readers monitor and detect gaps in understanding, since three out of four readers who made these had strong prior knowledge. Reader metacognitive intrusions show that Jack and Margaret monitored their understanding like Jeffrey. For example Margaret (Table 38) inferred "I can't picture how anyone could get out of a Chicago slum"[INTR 2] in comparing microlending to "track" betting in terms of risk and effectiveness in helping the poor.

Table 46 showed that the effect of intrusions on reader process varied amongst individuals. Some intrusions helped readers to integrate text propositions with what they already know through either specific, associated instances or general associated knowledge. With this additional information, readers could situate textbase propositions within the more global framework of their knowledge of the world, which aided interpretation of text message. Other intrusions helped readers to gain metacognitive awareness of their process efficiency and detect problems with their own understanding. Both inference and metacognition revealed in intrusions helped readers to construct higher level interpretations of the passage. Yet some readers were either able to do so without these resources, or did not reveal evidence of using these resources.

In summary, on Passage 2, there was a trend for readers with strong prior knowledge, including Graeme, Jeffrey and Jack to make more inference and metacognitive intrusions that aided comprehension, than those with weak prior knowledge. Furthermore, these readers constructed a higher level, evaluative interpretations of text. There was also a trend for readers with weak prior knowledge not to recall the main idea, nor to make metacognitive intrusions during recall. However to overcome their problems, these readers used inference and metacognition to construct situational models, drawing upon whatever knowledge was available to them. Graeme, Jeffrey, Jack, Natalie, Brenda and Margaret made both kinds of intrusions and interpreted Passage 2 at higher, evaluative level. Both inference and metacognition aided higher level interpretation. All of the readers in the group were able to overcome any difficulties and effectively interpret text.

(d) Summary of inter-case results related to Research Question 1

The inter-case data over both passages showed that participants often did not remember

the main idea of an unfamiliar text, although they usually remembered the main idea of a familiar text. Participants also recalled between four and 23 micropropositions or details from texts that they read whether or not they recalled the main idea, and whether or not they had strong or weak prior knowledge. They also made errors in recalling information, including reversal of numbers. It is suggested that these performance trends may be indicative of persistent reading disability.

Inference was one way in which readers overcame not remembering the main idea, not having prior knowledge of the topic, recalling many details irrelevant to the main thrust of the passage and errors. Readers used whatever associated information was available to them, to infer specific information that can add or negate propositions in the reader's construction process, for example on Passage 2 Microlending, many readers used their own banking experience. Making a specific inference related to her own loan process led Belinda to infer that "individuals cannot get bank loans because they have not collateral or credit history. But a group acts as collateral, someone will speak to their name and see they are hardworking (and give them) a loan to start up, it makes sense" (Table 29). With this additional information, Belinda interpreted Passage 2 at higher, synthesis level despite weak prior knowledge, not recalling the main idea and recalling only two Level 3 propositions from the text macrostructure, as well as recalling 10 micro-level details. Using her own banking knowledge to infer meaning helped her to overcome her textbase difficulties and successfully interpret Passage 2. She also used inferred association between microlending and "North American Indians" (Table 29) that helped her to compare aid agency activities. Readers also inferred generalization of text information, which helped them to situate text information within the bigger picture of what they already know. On Passage 2, Belinda (Table 29) inferred the generalization "probably to my mind (this) would do much more to combatting all the world poverty that we keep hearing about than just trying to throw in aid money" [INTR 2] that had the effect of helping her to analyse the microlending concept "this is the way we should be trying to help people in areas of poverty not just in the third world" (Table 29). In this way readers can also take ownership of text information and make it personally meaningful, which happened to Belinda "I think it is a neat idea." Inference enabled readers to close gaps in understanding by providing additional information, or negating or deleting information currently held in memory. For example when Keith's memory of banking and

memory of textbase (Table 4) did not match he added the proposition "there must have been a profit in it (for banks)" to his mental model and negated the proposition that microlending loans were free.

There was an emotional component to prior knowledge, particularly in reading the cloning text. Readers responded positively or negatively to the text message and this could have positive or negative influence on reader process. Having a negative reaction did not necessarily influence reader outcome negatively. For example, on Passage 1 Belinda found cloning to be potentially "destructive" (Table 27) to mankind yet was able to recall the main idea and interpret at higher, evaluative level. Belinda responded positively to Passage 2, saying that it was a neat idea and although she did not recall the main idea, she interpreted at synthesis level.

As shown above, although individuals varied in resources brought to the task, in how they recalled and interpreted text and in what compensation they used when encountering difficulties, nonetheless apart from Jeffrey on Passage 1, the outcome of this activity for all was successful interpretation of text. The above data would appear to confirm that compensated readers use prior knowledge as a source from which to infer specific or general association and overcome comprehension difficulties. Furthermore readers may be aware of needing to do so. Prior knowledge was an important factor in inference, since those with strong prior knowledge tended to use this resource more than those with weaker prior knowledge. Metacognition was important in reader ability to detect and repair understanding and readers appeared to have strategies to help them overcome textbase difficulties. Reader strategies will be further explored in the next section of the data analysis and related to the second research question.

Participants in the study revealed several strategies in common including identifying the main points, re-reading, using prior knowledge, slowing down to focus, reflecting, visualizing, identifying bias, using key words, identifying the big picture, self-talk, identifying details and sub-vocalizing unfamiliar words. There appeared to be two broad kinds of reading strategies reported. The first were the kind of strategies identified in the literature as those of skilled readers (0akhill & Garnham, 1988) such as identifying the main idea, re-reading and identifying bias. The second were the kind of strategies used by LD readers (Wise & Olson, 1991) to overcome processing problems such as visualizing the meaning of text rather than relying on

words from the text message and sub-vocalizing unfamiliar words to try and use auditory as well as visual recognition in order to identify the word. Readers seemed to need both kinds of strategies in order to read successfully.

Skilled reader strategies seemed to help readers to understand the text message, for example, Keith stated that he "tried to pull out the main point" (Table 5) when reading Passage 1, and succeeded in recalling the main idea (GLOBAL 297) as well as two supporting ideas (MACRO 7, 30) despite recalling 12 micropropositions (Table 1). Keith was then able to construct a model of the situation that showed he had evaluated the worthiness of, and synthesized ideas in, the text. The strategy of finding the main idea was identified also by Jeffrey, Jack, Natalie, Belinda, Brenda and Margaret. Another strategy that was used by many in the group was that of re-reading text for greater understanding. For example, Belinda stated she "had to re-read passages, as sentences were quite complicated, sometimes I misread and had to go back" (Table 30) that helped her to recall the main idea (GLOBAL 297) and two supporting ideas (MACRO 228, 260) of Passage 2 despite also recalling13 micropropositions (Table 28). Her model of the situation showed she evaluated and synthesized the text message (Table 29). Re-reading the text enabled Belinda to reflect and compare "things to what I heard or read, and my own thoughts on this topic" that helped her "as sentences were complicated, sometimes I misread and had to go back" (Table 30). Other readers used this strategy including, Keith, Graeme, Jeffrey, Brenda and Margaret. A third strategy described by many participants, was use of prior knowledge to facilitate understanding. For example, Jeffrey stated that using "what is familiar, this guy said it, Coleman, prior knowledge" (Table 15)) helped him to read. On Passage 1, Jeffrey adopted a biased viewpoint, his "slant" on cloning, from his strong prior knowledge but on Passage 2, again with strong prior knowledge, Jeffrey recalled the main idea (GLOBAL 299) and two other supporting ideas (MACRO 178, 173) (Table 13). Despite also recalling 15 micropropositions, Jeffrey was able to create a higher, synthesis level of model of the situation drawing upon his own experience and knowledge "I do work with C.I.D.A. and the concept of doing things at grass-roots level, this is one example of it." (Table 14). Other skilled reader strategies such as identifying bias and reflecting upon meaning also helped readers to comprehend, evaluate and synthesize the main ideas of the text. Participants were aware of using

these strategies to help them gain the big picture and to overcome any reading problems.

LD reading strategies seemed to help readers to overcome their slow speed of process, need to focus attention on the task at hand and word-level difficulties. For example, Graeme who interpreted Passage 1 at higher, synthesis level stated he had to slow down and focus on words "I started several lines, I was pulling words out so I tried to concentrate on what I was reading so I had the context correct, because sometimes I reverse words which changes the meaning." (Table 10). Other readers who said they did this too included Jeffrey, Natalie, Belinda and Margaret. Some readers, including Margaret, Brenda and Jeffrey, spoke words sub-vocally to help them recognize unfamiliar words. For example, Jeffrey stated "I mechanically move my tongue, say the words, it is not visible but it is still there" (Table 15) and seemed to whisper to himself while reading. Another LD strategy used by several readers, including Keith, Graeme, Jeffrey, and Brenda, was visualization. For example, Brenda stated, "I have a visual memory of facts, of meaning. I close my eyes and I see images" (Table 35). This strategy seemed to work for Brenda. She recalled three global propositions from Passage 1 (GLOBAL 297, 18, 54) including the main idea despite recalling 12 micropropositions (Table 31). It seemed that for these readers, the physical activity of reading was arduous and tiring. Belinda articulated a need to feel "well-rested" before she read (Table 30), and to be physically active as she was processing, thinking about meaning. Keith, Margaret, Brenda, Natalie said in the debrief interview that they had visual processing problems that meant they could only read for a short time and must be in good health to do so. Graeme, Natalie, Belinda and Margaret said they needed to get up and walk around while reading text, in order to occupy their body while their mind thought about the meaning of the text. Keith spoke of comprehending text in "little pictures" (Table 5) and the need to take time in creating these visual images. The creative nature of these kinaesthetic kinds of reading strategies needed further exploration and may relate to the "learned creativity" (Gerber & Reiff, 1994) in the literature.

(e) Summary of Inter-Case Reader Awareness related to Research Question 2.

Participants in the study were aware of using strategies, but sometimes unaware that their strategic activity was not effective. For example, Keith thought that he had identified the main points, "the main topic of each paragraph" (Table 5) on Passage 2, but he recalled only one Level

3 macroproposition (MACRO 178) and 14 micropropositions (Table 3). However he was able to create a higher level model of the situation (Table 4) despite poor textbase recall and failure of his strategy. Depending on the nature of the task, this could influence the reader's performance. If the task had been recall only, Keith's performance would not be as competent as it was on the interpretation task. Most readers were aware of what strategies work for them and when they need to use them. They also seemed to be aware of the effect of this activity on their reading performance. Some strategies helped them to perform like skilled readers, such as finding the main idea, and others helped them to overcome their perceived reading difficulties, for example sub-vocalizing unfamiliar words. Individuals seemed to be aware of their strengths and how to use them, also of their weaknesses and how to compensate for them. Participants were highly self-aware of their abilities and have a repertoire of strategies to help them to close gaps in understanding. That is, they use metacognitive knowledge and strategies to compensate for reading difficulties. The issue of reader awareness clearly is important to reader success but requires further investigation.

CHAPTER 5

INTERPRETATION AND CONCLUSIONS

This study contains a very large number of tables. Tables were used to facilitate a systematic comparison among the eight individuals in the study. In order to interpret data and draw conclusions about any new insights that the study contributes to the field, tables were constructed to relate the findings from data within the context of the existing research literature in the field. Tables 47 and 48 relate directly to Research Question 1 while Table 49 relates to Research Question 2.

Research Question 1. How do compensated readers overcome textbase difficulties?

Research Question 2. Are the compensated readers aware of compensating?

The tables are organized in the following way. The first column contains broad categories of resource found in the literature that could aid compensated reading. These include reader prior knowledge, memory ability, reading skill, self-awareness and metacognitive strategies, and interest or emotional response to text. The second column contains specific references in the literature to the resource. The third column contains new findings uncovered by the present study and information either observed by the researcher or reported by the participants. Where there are no new findings indicated, the study confirmed those of the literature.

In this way, even with a small sample size, it is intended to show that this study is both confirmatory of current findings in the field and original in revealing new information about the processes and strategies of successful compensated readers. Conclusions and implications of findings for educational practise will then be discussed.

Research Question 1. How do compensated readers overcome textbase difficulties?

Compensatory Resources. As the findings of the study revealed, compensated readers used resources such as prior knowledge, memory ability, metacognition, intelligence and affective response to the text message to overcome their textbase difficulties (as shown in Table 47). These findings appear to confirm the literature in the field, as shown in column two of Table 47. Further information was uncovered by the study, shown in column three of the table.

Being familiar with the text topic helped compensated readers overcome their problems, but it could also impair recall and the interpretation of the text. Expert knowledge did not help Jeffrey to recall (Jeffrey - TBM1) or interpret (Jeffrey - SM1) Passage 1. On the contrary, he already had a strong, possibly defensive reaction to the cloning topic and was unable to recall the main idea or to interpret Passage 1 at a higher level, as would be expected by someone with his rich knowledge resource and experience. Neither inference nor metacognition helped him. Jeffrey did not infer more general or specific reference to aid in comprehending the text, nor did he consciously attempt to overcome the bias or "slant" he knew he had. This finding confirmed the influence of affect (McNamara, Miller and Bransford, 1994) on reading performance. Prior knowledge did not help the subject Margaret to recall Passage 2, but did not impair her from interpretation.

Inference and metacognition appeared to be powerful compensatory resources for participants, as was found in the literature (McNamara, Miller and Bransford, 1994: Weller, Watteyne, Herbert and Crelly, 1994). But readers did not need to have strong prior knowledge to use these resources. Readers with weak prior knowledge were able to make general and specific inferences anyway and this helped them to overcome their textbase difficulties. They were able to delete, add and generalize inferred information to aid their understanding of text. For example on Passage 2 Jeffrey used a problem-solution frame to recall and generalize information from the text. He also added information to his mental model by inferring association between his previous work in a bank and microlending. This activity enabled the readers to compensate, as Brozo and Curtis (1994) had suggested. Readers may have used their general knowledge of the world to construct new meanings within their mental model, such as the "learned creativity"

process of Gerber and Reiff (1994). In effect, Margaret had weak prior knowledge of Passage 1, yet added information to her mental model using specific inference, her affective response to the text and metacognition (Margaret - SM1). This activity enabled her to construct a higher level model of the situation. Graeme and Natalie also had weak prior knowledge of Passage 1 yet overcame their textbase difficulties by use of inference. On Passage 2, Natalie had weak prior knowledge of the topic. She did not recall the main idea but made both specific and general inferences, which helped her to interpret the passage at a higher level of interpretation. Similarly, Keith, Belinda and Brenda overcame their weak prior knowledge by using inference to close gaps in their understanding. Overall readers with weak prior knowledge were nonetheless able to use inference to close gaps in understanding. This was a new contribution to the field.

Compensated readers did not show the "levels effect" (Kintsch, 1974) of NLD readers. Despite their success in everyday reading tasks, they did not recall the main ideas of text better than the supporting details. On the contrary, participants performed like poor readers (E. Kintsch, 1991) in their poor recall of the text message, due perhaps to alphabetic difficulties (Frith, 1985), or to decay of information due to a slow and inaccurate rate of language process (Roth Smith, 1991) or the limited capacity nature of their short term memory (Stanovich, 1980). Seven participants remembered the main idea of 1:2 of the passages. One participant, Natalie, did not recall the main idea from either text. But poor macrostructure recall did not impair their ability to interpret text, even if it were unfamiliar.

Metacognition played an important part in LD compensation. Readers were usually, but not always, accurate in their perceived use of reading strategies. Apart from Jeffrey on Passage 1, they were all able to successfully interpret the texts, whether or not they had awareness of their efforts to compensate for problems. Jeffrey on Passage 1 knew his "slant" would influence his "interpretation," and it did. He was the only compensated reader who did not interpret both texts at a higher level. Keith used a problem-solution schema in recalling Passage 1 and was aware of doing so. The other seven readers had some awareness of the effectiveness of their performance and their efforts to compensate for their disability. There is further discussion of this reader resource related to the second research question.

Table 47

Resources of Compensated Readers

Resources	Information found in the literature.	New information contributed by this study
Prior Knowledge (PK)	PK helps readers comprehend text (McNamara, Miller & Bransford, 1994; Kletzien, 1991; Afflerbach, 1990; Wilding & Valentine, 1996; Afflerbach, 1990).	PK can lead to bias and impair comprehension
	Experts retain more propositions and infer more general and specific reference (Ericsson & Kintsch, 1991)	Expert PK did not help all to retain and infer more
	PK helps readers infer general association (Kintsch, 1988).	Readers generalized meaning whether they have PK or not
	PK helps readers infer specific association (Kintsch, 1988)	Readers infer specific association whether they have PK or not
	PK helps readers recall text main idea when they recall few macropropositions (Kintsch, 1988).	PK helped some readers but not all readers
	Low PK restricts reader associative network for mental model building (Kintsch, 1988)	Low PK restricted some but others used inference to close gaps in understanding. association
	Compensated readers use top-down expectancies when word level difficulties impair comprehension (Stanovich, 1980, 1991).	
Reader memory ability	Readers remember macro- better than micropropositions - the "levels effect" (Kintsch, 1974; Kintsch & Keenan, 1973; Zerhouni; 1996; Mandler & Johnson, 1977).	Compensated readers recalled more micro than macropropositions
	Readers who recall micro and few macropropositions have poor recall of text main ideas and difficulty interpreting text message (E. Kintsch, 1990).	Compensated readers are able to interpret well despite high micro and low macro recall of text propositions
	Readers can learn from texts with inconsistent and unfamiliar structure (Kintsch, 1994) even with poor textbase recall (Kintsch, 1988)	Reader models contained information not found in their textbase memory
	Able readers recall ideas high in text structure (Meyer, 1975).	Some readers did not recall ideas high in text structure

Reader metacognition and reading skill	Readers may be aware of inferring meaning or not. The former is goal-driven and akin to reasoning (Kintsch, 1998) Gifted LD learners prefer complexity (Gerber & Reiff, 1994) Able learners show flexible problem solving skill, awareness of task constraints, ability to impose top-down meaning on ambiguity (Berliner, 1994). Poor readers may only recall some of text ideas (Stanovich & Cunningham, 1991). Able LD readers develop orthographic skill despite chronic phonological difficulties (Frith, 1985; Stemmer & Whitaker, 1998). Good readers learn from text by "problematizing" about meaning (Deegan, 1995; Kintsch, Britton, Fletcher, E.Kintsch, Mannes & Nathan 1993; Kintsch, 1994).	Compensated readers recalled the main idea of 1:2 passages not both Readers had skills to overcome not recalling the main idea and to interpret text effectively. Some readers used a problem and solution framework in recalling text and were aware of doing so.
Interest or emotional response to text	Reader mental models are influenced by affect (McNamara, Miller & Bransford, 1994). Reading has an emotional component and some readers miss text main "point" because of personal view and inappropriate use of prior knowledge (Williams, 1990; Vespi & Yewchuk, 1992). Able LD readers are interested and motivated to learn (Adelman & Vogel, 1998)	

Overall, the findings of the study showed that readers had compensatory resources to overcome their disability. These could be the orthographic skills of Frith (1985), but this was difficult to ascertain. Readers' compensatory skills, framed by the reading model of Kintsch (1988), were like the hypothesized interactive-compensatory skills of Stanovich (1980). Readers used top-down mechanisms to detect and repair gaps in meaning construction using inference and reading strategies. These included their own intelligence, inferential reasoning, problem solving skills, meta-linguistic awareness and such to impose top-down meaning on ambiguity (Berliner, 1994). Compensated readers in the study were not deterred by having to overcome challenge. Indeed many participants reported a preference for complexity and a need for challenge, like Gerber and Reiff's (1994) gifted LD.

Compensatory Strategies. The data appeared to confirm that participants in this study used compensatory strategies in reading, communications, attribution, perception and the environment to make sense of text as did Wise and Olson's (1991) compensated readers (as shown in Table 48). It was unknown if they utilized text structure to predict meaning or visual strategies to decode, but they did seem to use context and comprehension skills as Bacon and Carpenter (1989) hypothesized. The kind of strategies individuals reported using, which was sometimes confirmed, were similar to those of both skilled and compensated disabled reader strategies in the literature.

Participants reported using listening and speaking skills and being "good with people" to learn from others what they could not read for themselves. This confirmed findings in the literature. Jeffrey reported having a coffee pot in his office to encourage social exchange and learn new ideas in his field by listening, and so avoid reading. Jack and Brenda reported having strong people skills while, in the literature, most LD are found to have poor social skills. How these individuals developed strong social skills and what coping strategies they use in their work environment requires further investigation, such as if compensated readers are strong visual learners with strong nonverbal communication skills.

While most individuals accepted and worked with their disability, only Jeffrey felt advantaged by it. Jeffrey reported that his mathematical and visual abilities had overdeveloped as a result of his avoidance of using and difficulty in developing language processing skills. Others, such as Brenda, felt that they had to work harder to achieve the same results as peers, and that having a disability limited their career prospects. Brenda would have liked to be a specialist rather than a general practitioner. Some compensated readers held an important role in their family constellation and had a positive perception in their early recollections of reading, as did Morawski's able adult readers (Morawski, 1992: Morawski, 1995). Keith, Graeme, Jeffrey, Belinda and Brenda occupied leadership roles in their family constellation, but Jack, Natalie and Margaret did not. The former readers felt they had a positive self-image (Adelman and Vogel, 1998), but the latter readers reported a negative self-image. Keith, Graeme, Jeffrey, Jack and Natalie had negative perception of early recollections of reading. No one had completely positive perception of early recollections of reading, although Belinda, Brenda and Margaret had

Table 48
Compensatory Strategies of Compensated Readers

Compensatory Strategies	Information found in the literature.	New information contributed by this study
Reading strategies	Compensated readers use context and comprehension skill to compensate for decoding problems (Wise & Olson, 1991). Compensated readers can use text structure to predict meaning (Bacon & Carpenter, 1989). Compensated readers use visual strength in word chunking to overcome difficulties (Spear-Swerling & Sternberg, 1994). Good comprehenders use strategies such as rereading, identifying main idea to help make sense of text (Baker 1989)	Compensated readers use reading strategies such as rereading to overcome their disability.
Communication strategies	Compensated readers have good oral language. They know how to get what they need in socially acceptable ways (Adelman & Vogel, 1998; Wilding & Valentine, 1996; Gerber & Reiff, 1994; Weller, Watteyne, Herbert & Crelly, 1994; Rawson, 1968)	
Attribution and Affect	Able LD understand their disability, set realistic goals and take responsibility for compensations to maximize their strengths (Spekman, Goldman & Herman, 1992; Weller, Watteyne, Herbert & Crelly, 1994). Successful LD are self-accepting, use help, have a positive self-image and expect to succeed (Adelman & Vogel, 1998). Successful adult readers have an important role within their family constellation (Morawski, 1992) and positive recollections of early reading experiences (1995).	Only one subject felt advantaged by their disability. The others felt negatively toward it. Three readers reported having negative self-image. Some compensated readers reported having an important role within their family constellation. Some did not. Some reported positive early recollections. Some did not.
Perceptual accommodations	LD readers have auditory perceptual difficulties (Tallal, 1991). LD readers disability does not usually relate to visual perceptual difficulties (Vellutino, 1989). LD readers have sensory difficulties related to speed and complexity of language (Tallal, 1980)	Some readers rotated page to see words more clearly and reported visual problems Some reported slowing down when challenged, others that diverting motor activity helped them to focus
Physical accommodations	–	3 readers reported a need for good health for maximum reading potential 6 reported avoiding strain of reading unless necessary

both positive and negative perceptions.

There were some interesting and unexpected findings reported by individuals as to the perceptual accommodations they made for their disability. Most reported having auditory process problems that forced them to listen carefully to oral information. Graeme, Jeffrey, Brenda and Margaret reported repeating words sub-vocally to recall their meaning. They had difficulty understanding the phonological code to lexical access in Stanovich's (1980) terms and reported problems in the visual processing of language. Keith, Jack, Natalie, Belinda and Margaret found it helpful to make visual improvements to the reading task in order to improve their performance. Keith used coloured acetate sheets to improve the contrast between paper and text. Margaret liked to rotate text around to see words more clearly. Another finding was that some readers improved their attention by doing the task for a short time, taking a break, or carrying out a diverting motor activity such as walking or tidying up. Graeme and Belinda reported using this strategy.

Another strategy readers reported was the need for optimal physical conditions to carry out a reading task. Margaret reported a need to feel "rested" to perform a reading task well. Belinda reported a need for "good health" for optimal performance. Many reported that for them reading was a physical strain. Margaret described reading as a "put-down for me," which she tried to avoid, "as much as my life today is reading dependent - I hate it." Reading was very tiring and several reported making mistakes as a result of such fatigue. Avoidance was another compensatory strategy for participants to not experience the physical discomfort of reading. Compensated readers liked to learn by listening and seeing visual images. They had a positive attitude, expected to succeed, and usually met this expectation. A detailed discussion of readers awareness of the need for and the use these strategies follows below.

Research Question 2. Are they aware of compensating?

As shown in Table 49, readers had some awareness of their textbase difficulties and of using strategies to compensate for them, but not always. Sometimes they knew that they had not understood what they were reading and that they had used strategies to repair their understanding. Sometimes they did not. Graeme was aware that he had difficulty reading Passage 1. He reread sections of the text orally, repeating some words sub-vocally. Graeme revealed in his debrief interview that he was aware of doing this. Unlike younger LD readers in the literature, compensated adult readers appeared to have some executive control of their own process. They were able to monitor their own understanding and using repair strategy when they perceived problems, and were often aware of doing so. But like Pressly, Ghatala, Woloshyn and Pirie's (1990) able adult readers, readers in the study at times overestimated their own ability to comprehend the text and missed the main idea.

Overall, compensated readers showed strong awareness and control of their own understanding processes and ability to initiate repair strategies to close gaps in their understanding of text. This was a most important compensation resource and one that is termed "metacognition" (Garner, 1987) in the literature. Without awareness of his own difficulty, the reader would tolerate errors or conflicting information, and not activate available resources to overcome difficulty. Reader metacognition is critical to effective compensation. By taking control of his own process, the reader monitors and evaluates his own reading effectiveness, and seeks to improve his own understanding.

Table 49

Reader Awareness of Strategy Use

Reader Awareness	Information found in the literature.	New information contributed by this study
Self-awareness or metacognition	Readers can control their own reasoning about meaning (Kintsch, 1994). LD readers have poor executive control of short-term memory (Swanson, 1993; Garner, 1987; Brown, 1988). LD readers do not plan, monitor or evaluate their own understanding and often overestimate their comprehension (Pressly, Ghatala, Woloshyn & Pirie, 1990). Able LD know their own abilities and need for accommodations (Adelman & Vogel, 1998) Able LD readers monitor their understanding and identify difficulty (Stanovich, 1980).	Readers knew when they didn't understand and used repair strategies such as rereading Reader showed executive ability although some missed the main idea

IMPLICATIONS FOR FUTURE RESEARCH

The Enhanced Kintsch model provided a practical theoretical framework of compensated reading to examine the resources, processes and strategies of compensated readers. It also provided a qualitative method of studying individual reading ability. As well, it provided a tool for study of LD adult reading effectiveness rather than study of reading disability in LD children. The Enhanced Kintsch model provided a dynamic framework within which to study the on-line processing of compensated readers, who until now have been largely an enigma. It provided evidence of LD adult reading success. Until now, with little understanding of LD success, the field has been deficit-oriented and more studies are needed of LD ability. The Enhanced Kintsch model uncovered the kind of task-specific information about reading that is missing in the LD literature.

This study opens the door on study of task-specific information about LD compensation. Future studies of LD success in this and other domains would be useful to interventionists and provide more task-specific information about compensation. For example, there is current recognition that language plays a strong role in learning mathematics. Poor reading comprehension often impairs the performance of LD students in this subject area, preventing them from realizing their potential. Language processing problems can impair learning in many other domains also since it plays and important and a pervasive role in most high school, university and job training learning tasks. More task-specific information about LD compensation in these critical areas is needed to ensure that LD adults not only realize their potential, but avoid the professional and personal cost of failure. Further study is needed to explore how information from this study could be used to create interventions for young children.

Prior knowledge is vital to LD compensation. However for compensated readers, reading is a slow way to acquire knowledge, it would be useful to explore other ways of acquiring knowledge for example by use of video, audiotapes, compact discs, visual displays, such as posters and informative talks. The reliance of schools on read and write learning strategies disadvantages these children. Further study is needed of the other ways of acquiring knowledge.

Metacognition is also vital to compensation. LD learners have the potential to understand their own difficulties and compensations. Perhaps rather than training individuals to use the kind

of strategies regular skilled readers use, it would be more useful for educators to promote self-awareness in the LD reader and take a coaching role, rather than a trainer role, in identifying and learning compensatory strategies useful to the individual and using guided practise to encourage their use.

A qualitative framework such as Enhanced Kintsch can be used to examine individual reader ability, to find out what problems the reader is having, and what strengths he utilized to overcome these problems. This diagnostic approach is less pathological than current instruments and provides information that is directly relevant to the individual learner. This is particularly important in a special population in which individuals can vary in severity and degree of disability. The framework could be used to inform the LD learner about his strengths and showing him the effect of his own strategic activity, a self-assessment tool. LD individuals could be empowered to take ownership of their own learning and be proud of their abilities. Perhaps even a mentor program of compensated adults with struggling young LD readers could be set up to provide youngsters with a model, and show that LD can equal success. Another approach is needed in which LD abilities are strengthened and enriched, and compensation is emphasized not remediation. Keith, Graeme, Jeffrey, Jack, Natalie, Belinda, Brenda, Margaret all learned to cope by themselves. With more information on LD success, their children can be helped by informed educators.

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APPENDIX 1

Passage 1 Reading Task: "Cloning"

The cloning of an adult mammal offers a striking example of how technology can outpace the moral and social thinking that would guide it, setting off a debate among ethicists, psychologists and theologians over how this new science might change the world. Dr. Glenn Bucher, theology professor at Berkeley compared cloning to splitting the atom, in that it has enormous prospects for evil or for good.

Until recently, cloning seemed a remote possibility. However when embryologist Dr. Ian Wilmut announced in Edinburgh, Scotland, that he had created a lamb from the DNA of a ewe, scientists and non-scientists alike were surprised. Talk inevitably leapt ahead to the idea of cloning humans, a possibility that raises a host of moral, psychological and legal questions, not to mention highly likely opposition from some powerful religious authorities like the Vatican. Until now human cloning has only been written about by science fiction writers like Aldous Huxley, who saw in it dark consequences for humanity.

From a religious standpoint, the pertinent question turns mainly on the morality of the act rather than whether a cloned person would be intrinsically a lesser being. Professor T. Peters at Pacific Seminary in Berkeley stated that according to how he reads the Bible, the status of a cloned person would not be any different to one born the "old-fashioned way." However, although he did not think human cloning was unethical in principle, he thought it "unwise" for such experiments to proceed without wide-ranging debate. For example he suggested that if human embryos are discarded or destroyed in efforts to clone humans, this would be an ethical issue. Professor Peters favoured a moratorium on any such experimentation until ethical issues are debated.

But the human possibilities raised by Dr. Wilmut's experiment carry an important psychological dimension, not least that they may excite people with the belief that a sort of immortality is at hand. Dr. R. Coles, the child psychiatrist at Harvard, suggested that human cloning tempts our narcissism because it gives a physical dimension to a fantasy that one can

keep going on through the reproduction of oneself. News about cloning has touched middle class anxieties about family life. People seem to have fixed on the idea of cloning as an opportunity to create the "perfect child", free of physical or emotional problems. In this way, he suggested, people would try to control the uncontrollable.

There are many other facets of ethics of cloning. For example there are also legal questions. Dr. A. Destro, a law professor at the Catholic University in Washington queried if clones would have the same status and legal rights as other people, particularly if they were created to perform specific work. He proposed that if clones were created to be used, this already differentiated them from regular people. From a philosophical standpoint, human cloning would offer a materialistic parallel to the Eastern religious belief in reincarnation. Biology and genetics prompt us to think like people from other cultures who talk about the soul moving from body to body. From a Muslim standpoint, Dr Hathout a Californian cardiologist, said that there were no limits on research because "knowledge is bestowed upon us by God." Creativity was a gift given to us to use. However on the issue of human cloning, he cautioned, problems related to how people use this knowledge, for good or for bad. From a Judao-Christian standpoint, there is the problem of how humans who tend to disobey God, use this new technology. The unpredictability of human nature is a potential for destruction as well as creation. In other words, while technology is neutral, human behaviour is not. The Vatican is highly unlikely to approve cloning of humans. Catholic teaching rejects reproductive technology that replaces sexual intercourse. Furthermore, Rev. R. McCormick, a Christian ethics professor at Notre Dame University suggests the very reasons for cloning are the reasons why you should not do so - for example replacing a dying child, creating a potential compatible organ donor or selective breeding of children. Rabbi Tendler of New York suggested that in history whenever man has shown mastery over man, it has always meant enslavement of man. Animal cloning may have merit, but human cloning was a potential danger to mankind. He suggested one good point about cloning was that at last scientists and theologians were creating a conversation together - a rare occurrence.

The New York Times, March 1997.

Passage 2 Reading Task: "Microlending"

Seamstresses, carpenters, street vendors and the proprietors of other small business enterprises in Bolivia are typically shunned by financial institutions. For these people, possible sources for loans have traditionally been familial or moneylenders charging up to 10 percent interest daily. Yet 72,000 of these entrepreneurs have been welcomed at BancoSol, turning that institution into the bank with the largest customer base in the country. The bank's decision is neither lunacy nor charity but rather a new financial experiment. BancoSol has become a prominent example of an approach to banking, now growing in popularity internationally, which demonstrates that borrowers without collateral can be good credit risks, faithfully repaying small loans such as $100. "Microcredit" may prove to be an important means of attacking poverty at its roots.

Lenders who provide this financing have demonstrated that credit schemes for the impoverished are not handouts. BancoSol is one of the few instances in which institutions originally subsidized by either government or private aid groups have become largely self-sustaining, covering expenses and the cost of capital. The Bolivian bank has placed certificates of deposit in capital markets in the US and Europe.

The BancoSol experience, also lenders such as Bangladesh's Grameen Bank, inspired a recent gathering in Washington, DC, of some 2,500 representatives of organizations from 113 countries, pledged to expand greatly the scope of their efforts. The Microcredit Summit, organized by RESULTS Educational Fund, a nonprofit group closely affiliated with the Grameen Bank, endorsed a plan calling on governments, financial institutions and aid-groups to work toward a goal of extending loans to 100 million of the world's poorest families by the year 2005.

Microfinance, which encompasses both lending and savings for the poor, has become the idea of the moment in the beleaguered international aid community, racked in recent years by substantial funding cutbacks. Although the template for a microfinance institution varies, the core concepts are often similar. A lending institution compensates for the lack of collateral (land or some other asset) by making individual loans to members of a so-called peer or solidarity group. Each member assumes responsibility for guaranteeing the loan-payback of other group-

members. BancoSol and Grameen report that less than 3 percent of loan repayments are late also default rates are still lower - a record superior to that of corporate customers in many developing nations.

Microfinance is not confined to the Third World. It was no happenstance that a sprawling convention hotel in Washington was chosen as the summit meeting place, rather than quarters in La Paz or Dhaka. In fact, BancoSol and Grameen have served as models for legions of U.S. copycats, mostly run by small nonprofit groups. Pulling oneself out of poverty by building a food stand in La Paz - or a hairstyling salon in Chicago - has universal attraction. The notion holds appeal to federal governments pledged to ease people off welfare. In a survey, the Aspen Institute in Washington, DC, found that the nearly 250 "microenterprise" programs in the U.S. last year represented more than a doubling in four years.

People's banking is not a new concept. Small credit unions emerged in Germany during the 19th century as an alternative to charity. Credit unions persist to this day, although many serve a more middle-income clientele with consumer loans. In the past 20 years, a few nonprofit institutions and specialized banks have succeeded in attracting astounding numbers of poor borrowers. Grameen, which lends almost entirely to women, and a unit of Bank Rakyat Indonesia, each have two million borrowers.

Growth of microfinance at rates anticipated by conference organizers will prove challenging. "The desire to inject tens to hundreds of millions of dollars in the Grameen bandwagon comes without the patient, two-decade buildup of human capacity, educational programs and local accountability that characterized the original," says Daniel M. Kammen, a professor of public and international affairs at Princeton University. "If you don't go through this evolutionary process however, you might end up getting the poor more in debt."

An article by the World Bank in Scientific American (April, 1997).

APPENDIX 2

Passage 1 Textbase Template: "Cloning"

Level 1, (highest Level) - The Text Main Idea:
Cloning has opened a debate between scientists, philosophers and theologians. (GLOBAL 297)

Level 2 higher level macro or global propositions - main ideas of text (includes text main idea):
(* numbers in bold are those which are ranked higher hierarchically when macro-rules at this level are applied and may be carried forward to next level)

Macropropositions No. **18 54 247 267** 297

Level 3 Macropropositions or supporting ideas of text (includes text main idea(s) or macropropositions):

Macropropositions No.

7 **18** 30 34 44 **54** 70 73 90 99 108 115 120 126 140 149 159 163 165 170 182 189 200 210 216 223 228 241 **247** 251 254 260 **267** 283 292 **297**

(Total number of macropropositions for this passage - 36)

Level 4 (lowest level) - Micropropositions or supporting ideas of textbase:

Micropropositions No.

5 8 12 15 35 38 51 61 71 79 80 81 91 95 129 136 160 186 193 201 217 242 259 270 274 275 284 285 298 299

Passage 2 Textbase Template: "Microlending"

Level 1, (highest Level) - The Text Main Idea:
Microcredit, as a means of attacking poverty at its roots, may fail if future expansion lacks the essential qualities of the original model. (GLOBAL 299)

Level 2 higher level macro or global propositions - main ideas of text (includes text main idea):
Macropropositions No. **69*** **135** **152** 299

Level 3 Macropropositions or supporting ideas of text (includes text main idea(s) or macropropositions):
Macropropositions No. 12 20 28 **46** 64 **69** **79** 92 101 **113** **135** **152**
161 **173** **178** **193** **204** 213 223 226 **234** 237
243 250 **258** 266 267 273 **287** **299**
(Total number of macropropositions - 30)

Level 4 (lowest level) - Micropropositions or supporting ideas of textbase:

Micropropositions No. **50** **53** **67** **72** **114** **115** **132** **134** **139** **196** **233** **259**
277 **278** **279** **283** **300**

APPENDIX 3

Passage 1 Proposition Examples: "Cloning"

Proposition examples from Passage 1 using the Kintsch macro-rules:

Hierarchical Level within Textbase	Proposition	Proposition Number
3	technology outpaces the thinking that guides it	7
1	cloning has initiated a debate among ethicists, psychologists and theologians over how cloning may change the world	18*
3	cloning has enormous prospects for good or for bad	30
3	cloning an adult animal was a remote possibility	34
4	until recently	35

(* denotes text main idea or macroproposition no. 18)

Passage 2 Proposition Examples: "Microlending"

Proposition examples from Passage 2 using the Kintsch macro-rules:.

Hierarchical Level within Textbase	Proposition	Proposition Number
3	financial institutions shun small businesses	12
3	small businesses borrowed money from family or moneylenders	20
3	Bancosol welcomes small businesses	28
4	a means to attack poverty at its roots	67
2	small loans to borrowers without collateral - microcredit (is) a means to attack poverty at its roots	69*

(* denotes part of passage main idea)

APPENDIX 4

Examples of Intrusions from Passages 1 and 2

INFERENCE	SUPPORTING STATEMENT
generalization	"people are generally quick to pay back on time" (NATALIE) "there is peer pressure" (JEFFREY)
elaboration	"3% delinquent is not bad, lost loans are worse 81% or something, non-retrievable loans" (JEFFREY) "(cloning is) possibly alright for animals but not for humans" (GRAEME)
bridging	"we are moving to being able to clone humans" (BELINDA)
analogy	"I heard an Indian guy talking about this and he had a bicycle and he was a microlender - having local people make decisions." (MARGARET) "microlending can get them out of welfare" (JACK)
METACOGNITION	
affect	"it is a nice thought" (MARGARET) "I already had a feeling about cloning which will slant my interpretation of it" (JEFFREY)
prior knowledge/experience	"I can't really picture how one could get out of the Chicago slum because of someone lending me a 100 bucks unless I put it on the horses" (MARGARET) "I don't understand reincarnation not being from that culture" (JEFFREY)
opinion	"some of the statements made about some of the religions were (not) necessarily accurate" (MARGARET) "less well-known religions are being represented accurately" (MARGARET)
self awareness	"The end was a bit convoluted, I had trouble with the last paragraph" (KEITH) "That is all, I have finished" (MARGARET)
ERROR	
factual error	"in a space of a year" (KEITH) "a convention in Chicago" (BRENDA)

APPENDIX 5

Examples of Reader Strategies on Passages 1 and 2

READING STRATEGY	RELATED ACTIVITY
Identify Main Points	Reader identified global propositions of text
Re-read	Reader reread text previously read
Use Prior Knowledge	Reader inferred meaning
Slow down and Focus	Reader slowed down his rate of reading and attended closely to the task
Reflect	Reader stopped reading to think about text message
Visualize	Reader created a visual image of text message, perhaps with eyes shut
Skim Read	Reader read quickly to identify main ideas in text.
Identify Main Idea	Reader recalled (GLOBAL 297) of Passage 1 or (GLOBAL 299) of Passage 2
Identify Bias	Reader identifies bias in author's message
Key Words	Reader identifies key words of text
Read for Interest	Reader reads text because of interest in it
Identify Big Picture	Reader identifies the main theme of text
Find Connections	Reader finds connections between text and what he already knows
Self-talk	Reader talks to himself to aid processing
Identify Details	Reader identifies micropropositions from text
Sub-vocalize	Reader says words to himself without uttering them