

The Role of Goal Orientations in Test-based Learning

by

Colin Arthur Chasteauneuf

B.Ed., University of Victoria, 1979

M.Ed., University of Victoria, 1993

A Dissertation Submitted in Partial Fulfillment of the  
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

In the Department of Curriculum and Instruction

We accept this dissertation as conforming  
to the required standard

© Colin Arthur Chasteauneuf, 2004  
University of Victoria

All rights reserved. This dissertation may not be reproduced in whole or in part, by  
photo-copying or other means, without the permission of the author.

Supervisor: Dr. Mary Dayton-Sakari

### ABSTRACT

A newly-emerging perspective of text-based learning conceptualizes reading as a strategic, goal directed process in which readers' goals determine their reading strategies. This study examined, in a direct and controlled manner, the role of motivational processes and goals in text-based learning. The study employed a 2 x 2 factorial between groups and truncated control group design in which two independent variables – motivational state and processing task – were manipulated to determine their effect upon two dependent variables – reading times of sentences and cued recall verbal protocols. One hundred thirty-three university-age subjects participated in the experiment. The results indicated that motivational states influenced the subjects' goal orientations and their subsequent selection of processing strategies and processing of text. Analysis of the cued recall verbal protocols demonstrated that, when reading unfamiliar text, subjects induced to adopt a mastery-goal orientation recalled significantly more textually-correct thought units than did subjects induced to adopt a performance goal orientation. These results suggest that educators and researchers should, in the future, begin to focus on conceptualizing differences in text-based learning as consequences of different motivational patterns.

Examiners:

## Table of contents

Title Page .....	i
Abstract .....	ii
Table of contents .....	iii
List of Tables .....	vi
List of Figures .....	viii
Acknowledgements .....	ix
Chapter 1 .....	1
Introduction .....	1
Purpose of the study .....	1
The problem in context .....	2
Current and developing trends .....	6
Summary .....	9
Definitions .....	12
Limitations .....	13
Rationale .....	16
Chapter 2 .....	19
Review of the literature .....	19
Historical background .....	19
Text variables in text-based learning .....	23
Knowledge variables in text-based learning .....	27
Motivation and text-based learning .....	33

Goal orientations and cognition .....	40
Individual and situational variables and goal orientation .....	46
Goal orientations and text-based learning.....	49
Summary .....	54
Research questions.....	56
Chapter 3.....	59
Method .....	59
Design .....	53
Setting .....	61
Sample.....	61
Materials .....	64
Measuring instruments.....	67
Procedure .....	71
Experimental treatments .....	73
Analysis of data.....	79
Chapter 4.....	86
Results of the study.....	86
Pre-test measures .....	86
Dependent variables.....	93
Discussion.....	101
Deep processing.....	101
Shallow processing .....	107
Summary .....	111

Chapter 5.....	113
Conclusions and recommendations.....	113
Summary of the study.....	113
Conclusions.....	118
Deep processing.....	118
Shallow processing.....	119
Motivation and text-based learning.....	120
Educational implications.....	121
Theoretical implications and recommendations for future research.....	123
Theoretical implications.....	123
Recommendations for future research.....	124
Concluding statement.....	127
References.....	129
Appendices.....	152
Appendix A – (Consent form).....	152
Appendix B – (Example of Modified Text and Contradictory Statement).....	153
Appendix C – (Examples of Questions for Text).....	154
Appendix D – (Modified Motivated Strategies for Learning Questionnaire Instruction Sheet).....	155
Appendix E – (Motivation Questionnaire).....	156
Appendix F – (Evaluation of topic familiarity ratings following experimental tasks).....	159

## List of Tables

<u>Table number</u>	<u>Table name</u>	<u>Page</u>
1.	Design – 2 x 2 Factorial plus truncated control .....	60
2.	Numbers and Gender of Subjects Assigned to Groups.....	63
3.	Familiarity of Topics Based on Median Scores .....	65
4.	Modified Sentence – Original and Contradictory .....	66
5.	Order of Topics in File Set.....	69
6.	Reading Levels – Familiar and Unfamiliar Text .....	70
7.	Thought Unit Analysis – Original Text, Questions, Verbatim Answers, and Analysis.....	84-5
8.	Correlations between Pre-test Measures, Dependent Variables, and Pre-test Measures and Dependent Variables.....	88-9
9.	Means and Standard Deviations for Reading Ability, Goal Orientation, Learning Beliefs, and Domain Knowledge as a Function of Group.....	90
10.	Analysis of Variance – Reading Ability .....	91
11.	Analysis of Variance – Intrinsic Goal Orientation .....	91
12.	Analysis of Variance – Extrinsic Goal Orientation .....	92
13.	Analysis of Variance – Control of Learning Beliefs .....	93
14.	Analysis of Variance – Domain Knowledge .....	93
15.	Mean and Standard Deviations of Reading Times of Contradictory Sentences and Situationally-correct Thought Units as a Function of Text and Experimental Condition.....	95
16.	Analysis of Variance – Reading Times of Contradictory Sentences in Familiar and Unfamiliar Text .....	96

17.	Analysis of Variance – Situationally-correct Thought Units in Familiar and Unfamiliar Text .....	97
18.	Means and Standard Deviations of Textually-correct Thought Units Recalled as a Function of Text Type and Experimental Condition.....	98
19.	Analysis of Variance – Textually-correct Thought Units Recalled as a Function of Text Type and Experimental Condition .....	99
20.	Test of Main Effects – Goal Orientation, Processing Task, and Interaction in Unfamiliar Text .....	100
21.	Analysis of Variance – Order in Which Familiar and Unfamiliar Texts were Read and Reading Times of Sentences .....	104

## List of Figures

<u>Figure number</u>	<u>Figure name</u>	<u>Page</u>
1.	Correlation between Median and Mean Rankings of Text Familiarity – Non-experimental cohort and Experimental Groups.....	106

## Acknowledgements

I would like to express my appreciation and thanks to Dr. Mary Dayton-Sakari and Dr. Lloyd Ollila for their friendship, guidance, support and assistance both in my professional and academic development and in the completion of this dissertation. Their patience, and the patience of my other committee members – Dr. Robert Fowler and Dr. John Walsh – allowed me to complete this work over an extended period of time.

I would like to thank my immediate and extended family for their ongoing support and encouragement from the time I began my university studies as an undergraduate until the completion of this endeavour. Special thanks to my mother – Elizabeth Olson, my father – Arthur Chasteauneuf, and my sister – Rebecca Sundberg, who have all encouraged my academic efforts over the years.

Among my friends, two especially – Edgar and Ruth Lloyd – have provided me with a level of support that cannot be measured. Ruth's unexpected death prior to my completing my Master's degree means that she cannot be here to see me take this final step. That is a great disappointment to me, but I know she would have been pleased.

I would also like to thank my friend, mentor and colleague, Dr. Peter MacMillan, who provided me invaluable assistance in understanding statistics and applied the right amount of pressure to get me back on track when I (frequently) strayed from my task.

To all of you, and to the many other friends and colleagues who supported me along the way, thank you.

## CHAPTER 1

### *Introduction*

#### *Purpose of the study*

Early reading theory was based on the assumption that reading comprises “a general linguistic coding process .... [in which] *an inactive memory responds to a linguistic symbol*” (Perfetti, 1988, p. 130). This viewpoint is no longer consistent with a newly-emerging perspective on the reading process that conceptualizes reading as a strategic, goal-directed process (Lorch & van den Broek, 1997) in which readers’ goals determine their reading strategies (Graesser & Zwaan, 1995). The constructionist theory of reading comprehension (Graesser & Kreuz, 1993; Graesser, Swamer, Bagget, & Sell, 1996; Graesser & Zwaan, 1995) proposes that a reader’s goal is to process text at the deepest and most global level possible. Research has demonstrated, however, that most readers appear to be satisfied with a shallow understanding of the texts they read (e.g., Vonk & Noordman, 1990). Mathewson (1994) argues readers develop goals for a variety of reasons, including their own values and purposes suggested by others and it cannot therefore be assumed that the reader’s goal is to process text deeply. Guthrie and Wigfield (2000) propose “motivational processes are the foundation for coordinating cognitive goals and strategies during reading” (p. 408). During reading, motivated goal-directed readers (McKoon & Ratcliffe, 1992) select and use processing strategies to develop either a surface-level understanding (Nolen & Haladyna, 1990a) or a deep understanding (Nolen, 1987) of the texts they read. In light of this research, therefore, it is not enough to know that certain individual and situational conditions may encourage

students to deeply process the texts they read; it is just as important to know the individual and situational conditions that mitigate deep processing and orient students toward the shallow processing of text.

However, no research has tested, to determine if the relationship is causal, the effects of motivational processes on readers' goals or the effects of these processes on the reader's decision to use either surface-level-processing strategies or deep-processing strategies during or following text-based learning. The hypothesis that there is a causal link between motivational variables and observable outcomes of the reading process requires direct and controlled experimental conditions (Nolen & Haladyna, 1990b). The purpose of this study was to examine – in a direct and controlled manner – the role of motivational processes and goals in text-based learning.

### *The problem in context*

As students progress through school from grade to grade, textbooks increasingly become their primary source of knowledge and much of the learning that takes place in the classroom is fundamentally text-based (Alexander & Jetton, 2000; Goodlad, 1976). In the secondary school classroom, texts are perceived to be the primary source for most of the subject-specific content to be learned and students are expected to learn the course content by independently reading the text (Camperell & Knight, 1991; Goodlad, 1976). Throughout my classroom experiences as a teacher of history, I became concerned that many of my students, following their reading of a history text, often demonstrated inconsistencies in their levels of understanding of the historical events described in the texts. The students knew how to read (in the sense that if asked, they could read the text

aloud), but often chose not to read, or remembered only parts of the explicitly stated historical information, developing what has been called a *superficial level of understanding* (Kintsch, 1994). Many others, unable to make explicit those temporal or causal connections between historical events that writers (and teachers) expect readers (and students) to infer, were either unable or unwilling to develop the *deeper level of understanding* (Kintsch, 1994) expected of students.

By the time students graduate from school they are expected to have developed the ability to independently read both familiar and unfamiliar texts and ascertain from these texts both directly stated and inferential information (Nolen & Haladyna, 1990a; Resnick & Resnick, 1977). This ability was particularly salient in my history classrooms because students were expected to independently read texts in which the connections between historical events often remain unstated (Armbruster, 1984; Britt, Rouet, Georgi, & Perfetti, 1994; Hennings, 1993; Josten, 1996; Perfetti & Curtis, 1986; Zinar, 1990) and to both remember the historical events described in the text and understand the causal relationships that were hypothesized to exist among these events (Graesser & Kreuz, 1993).

At the time I was teaching, learning theory had shifted from a behaviourist perspective concerned with stimulus-response associations to a general cognitive conception of learning that reflected “an overriding concern for the more complex forms of learning, that is, the types of learning frequently characterized as ‘meaningful’ or where one ‘learns for understanding’” (Schuell, 1986, p. 419). There had also arisen societal expectations about the literacy skills needed to function as citizens and memory for the explicit content in a text was not considered adequate (Camperell & Knight,

1991). Approaches to classroom instruction, guided by cognitive perspectives of information processing, attached “ever greater importance to meaningfulness, elaboration, and various other cognitive activities that require deep rather than shallow processing” (Graham & Golan, 1991, p. 193; see also Kintsch, 1992; 1994). In theory, research, and classroom practice, the *zeitgeist* had shifted “from the shallow to the deep levels of comprehension” (Graesser, et al., 1996, p. 1), but the problem remained: During reading and despite my efforts, most of the students in my classrooms gained only a superficial level of understanding of the historical events described in their texts.

As did many other educators, I turned to the literature to see if I could ascertain the individual and situational conditions under which my students might come to fully understand the historical situations described in the history texts. Then-current cognitive explanations of reading comprehension, however, provided little information about the conditions under which readers would deeply process text. According to Otto and White (1982), “We are troubled that kids who have no difficulty in decoding (at least, not in the basic symbols-to-sounds-to [-] words sense) continue to have difficulty with the reading tasks they encounter in school and in life” (p. xiii). Research by Beck and her colleagues (e.g., Beck & McKeown, 1988; Beck, McKeown, Sinatra, & Loxterman, 1991; McKeown & Beck, 1994) demonstrated that elementary-age students “often leave their study of history with limited knowledge, and often with misconceptions” (McKeown & Beck, 1994, p. 23). The results of this research confirmed that “the understanding that students were able to develop from the textbook ... was rather shallow” and the students’ recalls frequently lacked “the very information that provided the connections among events and ideas and explained their role in the historical sequence” (McKeown & Beck,

1994, p. 6). Research has demonstrated that even university-age students, while reading expository texts, seem to be “rather parsimonious in processing ... [and have] a tendency to satisfy themselves with rather shallow processing” (Vonk & Noordman, 1990, p. 462; see also McKoon & Ratcliffe, 1992).

The problem has not been addressed. Recently, the popular press has reported on “the growing number of high school students who struggle with literacy” (Steffenhagen, 2002, October 25, pp. B1, B3). Massey and Heafner (2004) suggest that, in response, some secondary teachers “may spoon-feed texts to their students, reading a text aloud or summarizing an entire text for them” (p. 26). These findings were reflected in my experiences as a secondary school history teacher. My observations about the disparities among and within individuals, however, were not merely the result of personal and situational variables associated with my particular classroom. Other teachers also spoke of their students’ difficulties in fully understanding the information in the assigned texts. Inconsistencies among and within individual students were the rule rather than the exception and there appeared to be no conclusions about students, texts, or learning situations that could be drawn from the disparate anecdotal and research data. The students’ failure to obtain from their readings more than a superficial understanding of the information in the texts was and remains an important educational concern for teachers. If students are expected to develop an understanding of historical events, it will be necessary to determine the individual and situational conditions under which they will develop either a superficial or deep understanding of the texts they read.

*Current and developing trends*

One of the major theoretical problems of the cognitive view of human behaviour is its proclivity to assume mental states, processes, and behaviours as explanatory phenomena in their own right (Coulter, 1981). Early cognitive conceptualizations of text-based learning involved indirect observation of behaviours (e.g., recalls of texts, construction of inferences) and speculation about the mental mechanisms that could account for this behaviour. Schutz (1994), however, argues that an approach that focuses on behaviour at the expense of what energizes behaviour cannot explain how individual differences in behaviour arise in the first place. According to Sternberg (1998), motivation is the driving force at the centre of all cognitive activity. The failure of the cognitive paradigm to incorporate motivational variables into its models of reading has been influenced both by epistemological and ontological beliefs about the role of cognitive and motivational variables in text-based learning and by ontological beliefs about the very nature of motivation. The general cognitive paradigm used cognitive models of information processing and computer metaphors to guide much of the research on reading comprehension; motivation was seen as something external to the individual (Mathewson, 1994; Spaulding, 1992). Even though cognitive models of learning “were not intentionally designed to ignore affect, they did emphasize rational and cognitive processes” (Pintrich & Schunk, 2002, p. 277), and therefore tended to ignore motivational processes. As a result, theorists and researchers have traditionally studied cognition and motivation separately (Meyer & Turner, 2002) and empirical research on the role motivation plays in text-based learning has been slow in coming.

The failure of cognitive-based interpretations of the reading process to explain and predict processing behaviours (e.g., Keenan, Potts, Golding, & Jennings, 1990; Schallert, 1982; Vonk & Noordman, 1990; Wenestam, 1993; Whitney, 1987) has brought increased attention to how motivational factors mediate or mitigate a willingness in students to put forth effort and become actively engaged in learning from texts (e.g., Alexander, Kulikowich, & Jetton, 1994; Ames, 1992; Cramer & Castle, 1994; Guthrie & Wigfield, 1997, 2000; Mathewson, 1994; Meece, et al., 1988; Nolen & Haladyna, 1990a, b; Spaulding, 1992). According to Spaulding (1992), society in general consists of “people who by and large *can* read, but who choose not to” (p. 177). In the classroom, teachers realize that most students know how to read, but also realize that many choose not to engage themselves in reading for understanding (Spaulding, 1992). Some students have reported high self-efficacy in reading, but do not like to read (Oldfather & Wigfield, 1996). In classroom settings, teachers have often observed that some students avoid reading, read only for gist, minimize the time spent reading, and curtail effort (Guthrie & Wigfield, 2000). These behaviours have been associated with shallow processing of verbal material in word lists (Graham & Golan, 1991) and shallow processing of text (Nolen & Haladyna, 1990a). In contrast, teachers have also observed that other students attend to text meaning, persist at reading tasks for a longer time, display high effort, and avoid distractions (Guthrie & Wigfield, 1997; 2000). These behaviours have been associated with both deep processing in learning activities (Guthrie & Wigfield, 2000) and deep processing of verbal material in word lists (Graham & Golan, 1991) but the research has not determined if these behaviours are associated with deep processing of text. Because behaviors such as *choice of task*, *persistence*, and *effort* are considered

indices of motivation (Pintrich & Schunk, 2002), it is possible that individual differences in students' levels of understanding are explained by factors associated with motivation.

According to Pintrich and Schunk (2002) motivation is the process by which goal-directed behaviour is initiated and continued. Schutz (1994) argues that motivation is conceptualized in terms of the direction of thought and behaviour; individuals' cognitions and behaviours are therefore directed toward the goals they try to accomplish. *Learning* has been reconceptualized as "an active, constructive, and goal-oriented process that is dependent upon the mental activities of the learner" (Shuell, 1986, p. 415). To better understand learning, educators have been building detailed relationships between the fields of cognition and motivation (Alexander & Jetton, 2000), but only recently have educators begun to look at these relationships as they relate to text-based learning (Alexander & Jetton, 2000; Guthrie & Wigfield, 1997, 2000). The reading process is now viewed as a "fundamentally goal-directed and highly strategic" process (Lorch & van den Broek, 1997, p. 229; cf., McKoon & Ratcliffe, 1992). If motivation is conceptualized as a process "whereby goal-directed activity is instigated and sustained" (Pintrich & Schunk, 2002, p. 5), and it is assumed that "all psychological processes potentially affect all other processes" (Mathewson, 1994, p. 1148), then goals have the potential to affect reading comprehension processes.

Lorch and van den Broek (1997; see also Just & Carpenter, 1980; Graesser & Zwaan, 1995; McKoon & Ratcliffe, 1992) argue, "... readers' goals are an important determinant of their reading strategies" (p. 237). Research has demonstrated that text-based learning is differentially influenced by two sets of behaviours: *surface-level-processing* strategies and *deep-processing* strategies (Nolen & Haladyna, 1990a, b).

Because *strategies* “are defined as goal-directed behavior” (Nolen & Haladyna, 1990b, p. 126), it is reasonable to deduce that different goals mediate or mitigate individuals’ selection of different processing strategies. It can be argued from a theoretical perspective that different goals lead to a reader’s selection of either surface-level-processing or deep-processing strategies. Philosophical and theoretical arguments that describe what ought to take place during the processing of text are no substitute for empirical arguments that explain why and how *motivated* readers behave differently from *unmotivated* readers. Empirical research (e.g., Graham & Golan, 1991) has demonstrated that the relationship between motivation and the processing of verbal material may be more direct than previously believed. In the absence of a theory that incorporates motivational variables as a factor in text-based learning, establishing a causal link between goals and processing is a necessary step in developing our understanding of the role that goals play.

### *Summary*

It may well be argued that what the world does *not* need now is an elaborated theory of reading comprehension. Our understanding of motivated reading may be at such an early stage that the testing of hypotheses may be premature. Existing theories of text-based learning, however, have failed to account for the reader’s selection of the cognitive strategies associated with the shallow or deep processing of text and have provided little information that informs classroom instruction. There now exists a growing awareness of the importance of motivational factors in reading and a growing belief amongst educators that both “researchers and educators should focus on quality of

involvement and a continuing commitment to learning as consequences of different motivational patterns” (Ames, 1992, p. 262). The concept of motivated reading (see, e.g., Guthrie & Wigfield, 2000) has emerged because, over time, conceptual changes have occurred in our understanding of the role of motivation in reading (Cramer & Castle, 1994; Guthrie & Wigfield, 2000; Lorch & van den Broek, 1997; Mathewson, 1994; Ruddell & Unrau, 2004; Spiro, 1980) and what it means to learn from text (e.g., Kaestle, 1985; Kintsch, 1989, 1994; Resnick & Resnick, 1977; Stephens, 1988). This understanding has brought increased attention to the individual and situational variables that mediate or mitigate a willingness in students to put forth effort and become engaged in text-based learning (e.g., Alexander, et al., 1994; Ames, 1992; Cramer & Castle, 1994; Guthrie & Wigfield, 1997, 2000; Meece, et al., 1988; Nolen & Haladyna, 1990a, b).

Schutz (1994) has argued that goals mediate between motivation and cognition and it is likely that goals play a more prominent role in text-based learning than was previously supposed. Many theorists (e.g., Graesser & Kreuz, 1993; Lorch & van den Broek, 1997; Singer, 1988; van Dijk & Kintsch, 1983) assert that reading, to be conceptualized meaningfully, must attend to how the reader’s goals influence text-based learning. From this perspective, processing strategies that determine the quality text-based learning are conceptualized as goal-directed processes (McKoon & Ratcliffe, 1992) that develop as motivated students acquire knowledge and skills in specific subject-matter domains in school (Bransford, Sherwood, Vye & Reiser, 1986). Processing strategies develop as motivated students engage in activities in specific subject-matter domains that enable them to learn the subject-matter knowledge and develop the strategies necessary to either remember the explicit message in the text or fully

understand the situations described in the text. During reading, motivated, goal-directed readers (McKoon & Ratcliffe, 1992) use processing strategies to develop either a surface-level understanding that comprises the gist of the passage or a deep level of understanding that integrates text and knowledge (Moravcsik & Kintsch, 1993; van Dijk & Kintsch, 1983; Whitney, 1987).

This understanding suggested that an experiment that tested a hypothetical relationship between motivation, goals and processing strategies would be useful to the development of a comprehensive model of text processing, would provide new directions for research, and would lead to recommendations for classroom teachers about establishing both in their students and in the classroom conditions that discourage shallow processing and encourage the deep processing of text. Research has not yet demonstrated that a causal link exists between the personal and situational factors associated with motivation and the processing of history text. It seems reasonable to argue that readers' goals play an important role in determining a student's level of understanding following the reading of a history text. Research has established that differences in readers' goals lead to readers selecting different processing strategies during academic work, but has not yet determined if this maintains during text-based learning. The purpose of this study was to determine if differences in motivational states that influence readers' goals and lead to their selecting either shallow- or deep-processing strategies subsequently influences their text-based learning.

### *Definitions*

*Deep processing* – This term is used in this study to refer to the reader's use of those deep-processing strategies (Nolen & Haladyna, 1990a) that either integrate information within a passage or integrate information from the passage with prior knowledge (Nolen & Haladyna, 1990a; Royer, Carlo, Dufresne & Mestre, 1996) and lead to the deep level of understanding (Kintsch, 1994) expected of students. From a motivational perspective, it is the level of understanding associated with reader behaviours such as attending to text meaning, persisting at reading tasks for a longer time, displaying high effort, and avoiding distractions (Guthrie & Wigfield, 1997; 2000). For purposes of this study, *deep processing* is operationally defined as either a) an answer to a question that infers information not stated explicitly in the text; that is, that goes "beyond the text itself" (Kintsch, 1994, p. 295) or integrates the text "with what was already known" (Kintsch, 1994, p. 294); or b) a significant difference, between experimental treatments or between an experimental treatment and the control condition, in the reading time of a sentence that contradicts an inference the reader should have made while reading the text.

*Shallow processing* – Shallow processing refers to the reader's use of those cognitive strategies, "such as memorization and rehearsal" (Ames, 1992, p. 263) that are associated with memory for the explicit text and a superficial level of understanding (Kintsch, 1994). According to Royer, et al. (1996), comprehending the surface meaning of the text means "the ability to read a text, commit the essential gist of the text to memory, and subsequently report that gist in some form" (p. 377). From a motivational perspective, it is the level of understanding associated with reader behaviours such as

reading for gist, minimizing time spent reading, and curtailing effort (Guthrie & Wigfield, 2000). For purposes of this study, *shallow processing* is operationally defined as (1) an answer to a question that indicates memory for explicitly-stated information in the text (Moravcsik & Kintsch, 1993) or 2) no significant difference, either between experimental treatments or between an experimental treatment and the control condition, in the reading time of a sentence that contradicts an inference the reader should have made (Just & Carpenter, 1987).

*Text-based learning* – Text-based learning refers to what has been stored in memory or what has been remembered following the reading of any text. The term, therefore, applies to the products of either *deep processing* or *shallow processing*. The term is used in this study when the context requires a general, rather than a specific term.

### *Limitations*

Research studies have certain natural limitations. The extent to which the findings of this study may be generalized is restricted by a number of limitations inherent in the design. The most important limitations are listed below:

1. The subjects were not randomly *selected* from the total population, and it was understood that “those participating in the experiment may be representative of an available population, [but] may not be representative of the population to which the experimenter seeks to generalize [his] findings” (Cohen & Manion, 1994, p. 171). According to Jaeger (1990), “... there is no way of *ensuring* that the groups to be compared in a research study will be comparable to each other at the outset of the study, [but] an excellent method

of increasing the likelihood of comparability is through the random assignment of subjects to groups” (p. 111). The process of randomization controls threats to internal validity and “ensures the greater likelihood of equivalence, that is, the apportioning out between the experimental and control groups of any other factors or characteristics of subjects which might conceivably affect the experimental variables in which the researcher is interested” (Cohen & Manion, 1994, p. 168). The potential lack of representativeness of the target population was accepted as a limitation of the study.

2. The sample for this study was comprised of psychology students enrolled in first- to fourth-year university courses and arts and science students enrolled in first- and second-year university courses. The findings of the study cannot be generalized to the same or other populations in other settings (Cohen & Manion, 1994).
3. Experts’ beliefs about the deep processing that the subjects *should* have engaged in while reading the history passages were used as the criterion against which the subjects’ actual deep processing was assessed. It *cannot* be assumed that either my or the classroom teachers’ philosophical perspectives (i.e., our beliefs about a particular inferences that *should* be made) necessarily represents empirical reality (i.e., the inferences that students will actually make). Graesser and Riha (1984) reported that researchers (e.g., Graesser, 1981; see also Graesser & Clark, 1985; Graesser & Goodman, 1985) have established empirical methods for estimating numbers of inferences

constructed during reading, including think-aloud and question-answering protocols but indicate that practical considerations obviate the use of these methods. However, both subject think-aloud and question-answering protocols are very time-consuming (for example, Graesser and Riha indicated that, if completed, the collection and analysis of subject think-aloud data for 12 short passages would consume 2 years or more of time). Researcher-determined inferences are, in this sense, likely subject to the same criticism leveled at researcher text-familiarity ratings: neither valid nor reliable. It appears incongruent to carefully control text-familiarity ratings but reject an empirically-tested method of determining the subjects' abilities to draw inferences. In the history classroom, however, the inferences that need be drawn for understanding are established externally; that is, history teachers, by virtue of setting tests and exams, are the arbiters of what constitutes understanding. The purpose of this present study was to determine if subjects would draw inferences required for understanding – and the history teacher determines understanding in history classrooms. The use of researcher- and teacher-determined inferences was accepted as a limitation to the study.

4. The validity of the study rests upon the reliability and validity of the measuring instruments used. Unless reliability and validity have been noted, the instruments may not accurately reflect the process being measured.
5. It has long been understood that different subjects in experiments react differently to experimental conditions. Despite careful control of

experimental conditions, these Hawthorne effects (Cohen & Manion, 1994) influence different individuals in different ways.

6. This study used history texts as materials. According to Graesser (1981), narratives are more easily remembered than discourse genres. It has been argued by Britt, et al. (1994), that history texts are basically narratives with temporal and causal connections. My teaching experiences in the classroom suggest (anecdotally) that students have more difficulty remembering history texts than remembering narratives. Though neither Britt et al.'s nor my analysis has been empirically supported, the findings in this study are not generalizable to other types of expository discourse (e.g., science texts).

#### *Rationale*

This study is important from the viewpoints of theory, research, and classroom practice. Current theories of reading comprehension based on a cognitive perspective lack explanatory power (Schallert, 1982; Wenestam, 1993; Vonk & Noordman, 1990; Whitney, 1987). A comprehensive theory will explain a wide range of reading behaviours and will account for both on-line processes (e.g., shallow or deep processing) and the effects of processing on the products of reading (e.g., recall of text content; elaboration of content) (Lorch & van den Broek, 1997). Much of the past research on text-based learning has focused on correlations between knowledge and text variables, and research on motivational variables indicated that correlations exist between motivation, goals, and learning strategies, but correlations do not imply causality. Lorch and van den Broek (1997) argue “there have been relatively few attempts in the cognitive

literature to study strategic processing” (p. 238) and Graham and Golan (1991) maintain “there have been few empirical attempts to relate motivational variables to the general principles of cognitive psychology or information processing” (p. 187).

This study extended the work of Graham and Golan (1991) and Nolan and Haladyna (1990a, b) in that it used history texts to determine if the findings in those studies apply to situations in which students read connected text. History texts describe historical events but often leave implicit the causal relationships between the events and readers are expected to make explicit these relationships (Britt, et al., 1994; Henning, 1993; Josten, 1996). History texts therefore serve two purposes in this present study: first, they provide materials for experimental purposes that require both shallow and deep processing; second, they fulfill my personal interest in determining why many students, when reading about historical events, fail to fully understand the cause and effect relationships between the events. From the perspective of classroom instruction, an elaborated theory and experimental research can provide teachers with a foundation for understanding how individual and situational variables associated with motivation influence both what a reader does during reading and what a reader can remember after reading. Nolan and Haladyna (1990b) report that much of the classroom instruction in many content area subjects continues to centre on behaviours associated with the *shallow processing* of text in which students are expected to remember only the explicit content of the text. This study may encourage teachers to incorporate motivational factors into their classrooms that will enable them to implement both instructional approaches that encourage the effective use of deep-processing strategies and remedial approaches that identify and correct strategies that encourage surface-level processing strategies.

Chapter 2 of this study comprises a review of the literature in the separate fields of reading comprehension and motivation and an attempted synthesis of the literature as it pertains to this study. Chapter 3 contains the methodology employed in both the collection (including the design and procedures) and the analysis of data. Chapter 4 describes and interprets the data. Chapter 5 presents a summary of the study, the conclusions derived from the data, recommendations for further study, the significance of the study for the field, and educational implications.

## CHAPTER 2

### *Review of the Literature*

#### *Historical background*

There is currently a general consensus among educators that reader, text, and instructional variables are crucial to text-based learning (Alexander & Jetton, 2000; Flood, Lapp, & Fisher, 2003; Pearson & Dole, 1987). Research into text-based learning has examined the roles of factors associated with *text* (e.g., Graesser, Golding, & Long, 1991; Kintsch, 1974, 1982; Moravcsik & Kintsch, 1993; Pearson & Camperell, 1994; Weaver & Kintsch, 1991), with *knowledge* (e.g., Anderson, 1994; Kintsch, 1994, 1998; Ruddell & Unrau, 2004; Schallert, 1982), with *instructional demands* (e.g., Ruddell & Unrau, 2004; Walker & Meyer, 1980), and with *motivation* (e.g., Mathewson, 1994; Guthrie & Wigfield, 1997, 2000; Spaulding, 1992). However, the results of research investigating the role of either or both text and knowledge in text-based learning have been criticized for lacking explanatory power (see, e.g., Daneman, 1988; Keenan, et al., 1990; McKeachie, Pintrich, & Lin, 1985; Otto & White, 1982; Schallert, 1982; Vonk & Noordman, 1990; Wenestam, 1993; Whitney, 1987) and a similar conclusion can be drawn about studies that have used motivation to “explain” their results (e.g., Dole, Duffy, Roehler, & Pearson, 1991; Magliano Trabasso, & Graesser, 1999; O’Brien, Shank, Myers, & Rayner, 1988; van den Broek, Fletcher, & Ridsen, 1993). These theorists and researchers have questioned the ability of the cognitive and linguistic perspectives to satisfactorily explain their predictions about what is learned or remembered following the reading of texts and how the outcomes might be explained in

terms of cognition. To understand how present-day differences emerged among philosophical, theoretical, and empirical understandings, it is necessary to briefly examine the historical foundations of these disparate conceptions of text-based learning.

In the past, educators believed that students should be able to read familiar texts and take out and retain for future use the gist of what they had read (Stevens, 1988). This belief emerged from early conceptions of the nature of reading that viewed reading as the ability to look at written words and to say them orally. Behaviourist theories of language comprehension conceptualized reading as a linear process in which readers put together the meanings of adjacent words by translating letters on the page into the sounds corresponding to those letters and listened to the words produced by the sounds in the translation (Pearson & Stephens, 1994). The reader had to learn to respond appropriately to the printed symbols on the page (i.e., learn *associations* or *S → R bonds*). Access to the meaning of a text was explained by the reader's innate knowledge of the spoken language. The reader's ability to say the words was seen as a skill that could be conveyed to reading all subject matter. Comprehension was assumed when pronunciation was correct and natural. Reading was viewed as a set of hierarchically ordered sub-skills that, when mastered, equaled reading comprehension and readers were seen as passive recipients of the knowledge in the text (Dole et al., 1991).

In the early part of the twentieth century, classroom instruction shifted from oral reading to silent reading and because testing (rather than listening) was used to determine understanding, comprehension gained importance. Because all individuals were assumed to possess an innate understanding of language, it was believed that differences in vocabulary knowledge must explain differences in comprehension (Thorndike, 1917a,

1917b; Venezky, 1984). Classroom instruction therefore focused on developing students' vocabularies. Beck and McKeown (1991) reported that numerous researchers have noted there exists a high positive correlation between vocabulary knowledge and reading comprehension, and Daneman (1991) notes that vocabulary knowledge is one of the best single predictors of reading comprehension performance. Thorndike (1973), in a meta-analysis of studies of vocabulary and reading comprehension, found median correlations between vocabulary knowledge and reading comprehension of .71 for 10-year-olds, .75 for 14-year-olds, and .66 for 18-year-olds. In the 1980s, the *Journal of Reading* (1986) dedicated a special issue to vocabulary in which word knowledge was viewed as "an integral component of comprehension" (p. 580). According to Daneman, however, "... differences in vocabulary knowledge are the result of differences in reading skill rather than the primary cause of such differences" (p. 525). More recently, the explicit teaching of vocabulary has been de-emphasized in the classroom. According to Nagy and Scott (2004), the beliefs that words are learned by memorizing definitions and sentences are comprehended by putting together the meanings of individual words creates a picture that is not consistent with our current understanding of the reading process.

These early conceptions of text-based learning derived from a linguistic perspective yielded to later models that accounted for more complex forms of comprehension and conceptualized reading as an interactive process (Fagan, 1987; Rumelhart, 1980, 2004; Spiro, 1980) in which readers use information both from text and from memory to construct meaning (Anderson, Reynolds, Shallert, & Goetz, 1976; Rumelhart, 2004; Spiro, 1980). This view was first articulated in the works of Henderson (1903) and Bartlett (1932) who demonstrated the role of knowledge in recall of narrative

and expository text, and in the work of Thorndike (1917a), which viewed reading as an active process. Results of early research demonstrated that the semantic content of the text was not always remembered verbatim; both Henderson and Bartlett found that readers often remembered main ideas but forgot details, combined information that appeared in different places in the original text, and modified ideas in the text to conform to prior knowledge. These findings, occurring in the early part of the 20<sup>th</sup> century, were generally ignored because of the continuing influence of the importance of word identification, but are now recognized as the precursors to present cognitive explanations of both learning (see, e.g., Sternberg, 1998) and the understanding that inferences and elaborations (i.e., deep processing) are a necessary part of text-based learning (e.g., Bransford, Barclay, & Franks, 1972; Bransford & Johnson, 1972, Dooling & Lachman, 1972; Fagan, 1987).

The role of both text and knowledge in text-based learning has been the subject of much theorizing and research. Both past and current views of reading comprehension have focused and continue to focus on reading as a cognitive and linguistic process in which two sources of information – the reader’s knowledge and the text – interact to create an elaborated memory representation that includes information from both sources (e.g., Kintsch, 1992, 1994; Rumelhart, 2004; Spiro, 1980). Empirical studies and compilations of research on the reading process have been predominantly cognitive and linguistic in their emphasis (e.g., Balota, Flores D’Arcais, & Rayner, 1990; Clifton, Frasier, & Rayner, 1994; Barr, Kamil, Mosenthal, & Pearson, 1991; Daneman, MacKinnon, & Waller, 1988; Kamil, Mosenthal, Pearson, & Barr, 2000; Otto & White,

1988; Ruddell, Ruddell, & Singer, 1994; Spiro, Bruce, & Brewer, 1980; see also Leinhardt, Beck, & Stainton, 1994 for research on teaching and learning in history).

Researchers investigating text and knowledge variables have tended to focus their efforts on one of two perspectives: the more “scientific” text-linguistic perspective in which the text activates knowledge structures (e.g., Graesser, 1981; Graesser & Zwaan, 1995; Kintsch, 1992) and the schema-theoretic-perspective (e.g., Anderson, 1994) in which agency resides in the reader. Both perspectives see reading as an interactive process in which the reader uses information from both text and knowledge to understand the text.

#### *Text variables in text-based learning*

It has long been recognized that narratives, when compared to other discourse genres such as description, persuasion, and exposition, enjoy a special status in comprehension and memory (Graesser, 1981; Graesser & Riha, 1984; Mulcahy & Samuels, 1987). Graesser, et al., (1991) argue that schemas for narratives develop before school age while schemas for other genres require formal training. Because most individuals possess the same implicit knowledge structures, it was assumed that the differences in ease of remembering were the result of differences between the structures of the texts (i.e., narrative vs. expository) and theory and research focused on the demonstrated effects of text structure on the comprehension process. If people are to understand texts, it was supposed, the mental representations must be the same as the text; that is, there must exist a psychological equivalent to the “reality” of the text. It was assumed that implicit generic knowledge structures (schemas) developed as children

listened to oral stories and observed events in the real world (e.g., many oral narratives concerned individuals involved in events; events in real world are temporally sequenced; these events are “caused” by previous events and cause other events to occur) (Graesser, et al., 1991). These schemas that emerged from experience recognized and understood similar organizations in text (i.e., characters; their goals, motives, traits, etc.; temporal and causal connections). What was remembered following the reading of a text could be explained by congruence between the text and its psychological counterpart.

These theories have their foundations in structuralism and formal linguistics (e.g., van Dijk, 1972) in which readers were believed to develop an understanding of the explicit message in the text as a product of the automatic execution of linguistic elements in the text (Graesser, et al., 1996; Long, Seely, Oppy, & Golding, 1996). In narratives, these linguistic elements (i.e., structures) were conceptualized either as *story grammars* (Kintsch, 1977; Mandler & Johnson, 1977; Rumelhart, 1975) that represented the important *content* (i.e., setting, theme, plot, resolution), or as *causal networks* (Trabasso & van den Broek, 1990) that represented the underlying *organization* of the story. According to Mulcahy and Samuels (1987), “narrative structure ... helps readers comprehend a text” (p. 248). In expository texts, the structure was conceptualized either as *propositions* representing the basic unit of meaning in the *content* of the text (Kintsch, 1974; van Dijk & Kintsch, 1983); or as *rhetorical structures* representing the *organization* of the text (Meyer, 1975; Meyer, Brandt, & Bluth, 1980; Meyer & Freedle, 1979). Research by Meyer and Freedle (1979) demonstrated that expository text structure facilitated the recall of expository text.

These theories also had in common their *scientific* approach to studying comprehension. Because meaning was “in the text” (see Katz & Postal, 1964), it was expected that students would, following the reading of a text, remember the explicit information. It was assumed that inferences and elaborations made by the reader were of no consequence and were therefore ignored. According to Graesser, et al., (1996), early researchers focused on surface level processing because of the ease with which text factors could be manipulated and measured. These research methods were “the most familiar and defensible” because they involved “a careful manipulation of stimulus materials” (Graesser & Kreuz, 1993). These theories were scientifically testable in that measures of shallow processing could be compared with measures that existed *independent* of the reader (e.g., story grammars, causal networks, propositions, rhetorical structures). This approach also enabled theorists and researchers to remove human agency from the reading process. The “messiness” associated with “controlling” knowledge in experiments was averted by engaging in “compositional analyses that strip[ped] away most of the world knowledge” (Graesser & Kreuz, 1993) and employing measures of understanding that enabled researchers to predict, based on an analysis of the text itself, what would be remembered following the reading of a text. Research (e.g., Goetz & Armbruster, 1980; Richgels, McGee, Lomax & Sheard, 1987) that focused on manipulating text variables was successful in demonstrating the psychological validity of text structures; that is, memory representations of the explicit information in a text could be “explained” by the structure of the text.

Research into deeper levels of processing undertaken from a text-linguistic perspective typically looked at the relationship between comprehension and text by

holding reader variables constant and manipulating the explicitness of the connectives in the texts' structure (e.g., Beck & McKeown, 1988; Spyridakis & Standahl, 1987). Spyridakis and Standahl (1987) re-wrote texts to include connectives that made explicit the relationship between events described in the texts and found that readers were better able to recall the information in the text. Beck and her colleagues (e.g., Beck & McKeown, 1988; Beck, McKeown, et al, 1991; McKeown & Beck, 1994) re-wrote history texts to provide elementary-age readers with a more elaborated description (i.e., the rewritten texts were often twice as long as the original texts and included information that made the connections between the historical events explicit) and found that the students' recalls of the elaborated texts included more information. However, the use of this type of elaborated text suffers from ecological validity (Rowell, Moss, & Pope, 1990); these are not the types of text that students routinely encounter in their reading. This type of research demonstrated that elaborated texts and the presence of connectives facilitated text-based learning, but it cannot be taken as evidence that deep processing had occurred (i.e., the recall of elaborated text and explicit connectives following the reading of the texts can be interpreted as evidence that only the gist of the text had been encoded). It is possible to conclude from these studies that the readers' recall of the explicitly-stated information in the text was improved as a result of the text manipulation; however, the ability of readers to make explicit the information writers expect readers to infer was not tested.

According to Spiro (1980), the interactive nature of comprehension suggests "text structural approaches are misleading in their application for psychological process models" (p. 255) and Graesser and Kreuz (1993) argue "it would be a hopeless task to

explain these cognitive representations by merely analyzing the elements and dimensions of the physical stimulus per se” (p. 151). Research by Vonk and Noordman (1990) that used unedited texts and directly tested the role of text during deep processing found no effect for text, which led these researchers to speculate that deep processing results “if the information is more related to the reader’s purpose in reading and if the reader has more knowledge of the topic of the text” (p. 463). To understand text-based learning, it is necessary to understand how inferences are derived through interactions among the text, knowledge, and reader goals (Graesser & Kreuz, 1993).

### *Knowledge variables in text-based learning*

From the schema-theoretic perspective (Anderson, 1994), readers also use both their existing knowledge and cues from the text to construct a model of meaning from the text. This view of the reading process, however, considers as fundamental the prior knowledge that readers bring to a text (e.g., Alexander & Jetton, 2000; Anderson & Pearson, 1984; Anderson, et al., 1977; Dole, et al., 1991; Rumelhart, 1980; Spiro, 1980). Knowledge, however, is not a unitary construct, but comprises many diverse forms (Paris, Lipson, & Wixson, 1983). Prior knowledge is conceptualized as all knowledge existing in memory prior to a cognitive act (Dole, et al., 1991, note 1).

Theory and research have identified several forms of knowledge that influence text-based learning. It is assumed that some forms of knowledge develop in individuals over time as they engage in life and school experiences; for example, (a) knowledge about text organization (Alexander & Jetton, 2000; Pearson & Camperell, 1994; Spivey & King, 1994) (b) general knowledge about causal relationships (Moravcsik & Kintsch,

1993; van Dijk & Kintsch, 1983), and (c) knowledge of cognitive strategies used to make sense of text (Paris, et al, 1983; Paris, Wasik, & Turner, 1991; Spaulding, 1992). Others are understood to vary among readers; for example, (a) domain knowledge (Chiesi, Spilich, & Voss, 1979; Spilich, Vesonder, Chiesi, & Voss, 1979), (b) specific knowledge about a topic (Alexander & Jetton, 2000; Pearson, Hansen, & Gordon, 1979), and (c) generalized reading ability (Perfetti, 1988, 1989). According to the proponents of this perspective, readers use prior knowledge to interpret text and construct meaning (Anderson & Pearson, 1984; Anderson, et al., 1977; Rumelhart, 1980; Spiro, 1980) by engaging in reading strategies that enable them to find main ideas (e.g., Baumann, 1984), draw inferences (Gordon & Pearson, 1983; Hansen & Pearson, 1983; Pearson, et al., 1979), and elaborate upon explicit text (Hansen & Pearson, 1983).

*Knowledge of text organization.* According to Spivey and King (1994), readers "... approach text knowing how discourse is conventionally organized and how to use text structure to guide their understanding" (p. 669). Readers have developed an understanding of narrative forms of structure either by being exposed to oral narratives at a very young age (Weaver & Kintsch, 1991) or through experience with narrative reading or direct instruction in the home or in school (Ruddell & Unrau, 2004). It is also believed that the reader's understanding of expository text is enhanced by the "identification and use of the organizational plan used in the text" (Ruddell & Unrau, 2004, p. 1481) but that readers develop an awareness of expository text structure mostly through direct instruction (Meyer, Brandt, & Bluth, 1980; Weaver & Kintsch, 1991).

*Knowledge of causality.* According to Trabasso and van den Broek (1985), a reader's interpretation of events described in narrative text develops through the use of

naïve theories of psychological and physical causality. Britt, et al. (1994) extended this understanding to the reading of history texts, which they believe “have a narrative structure in which events are linked both temporally and causally” (p. 49). Research has demonstrated that children’s understanding of causality emerges at a young age (Lesser, 1977) and that this understanding leads to the development of cause-effect text schemas (Ruddell & Unrau, 2004) that readers employ as they read expository texts. Paris, et al., (1991) argue that strategies such as “connecting causal and temporal events, and integrating information across sentences” (p. 612) enable readers to embellish text information and elaborate upon the ideas suggested by the text.

*Knowledge of strategies.* Theorists and researchers (Paris et al., 1983; van Dijk & Kintsch, 1983) have conceptualized *strategies* as conscious, instantiated, and flexible plans readers apply and adapt to a variety of situations. Research has demonstrated that students “have acquired an adequate understanding of the functional value and appropriateness of various learning strategies by the late elementary years” (Meece, et al., 1988, p. 516). Older and more able learners are characterized by “the ability to appropriately allocate processing resources to effective learning strategies” (Nolen & Haladyna, 1990a) and motivational variables “begin to have a stronger influence than cognitive variables on students’ selection of learning strategies around the fifth grade” (Meece, et al., 1988, p. 516).

Theory supported by extant research maintains the idea that readers possess in common many characteristics that enable them to more fully understand the texts they read. For purposes of this present study, it is assumed that the subjects involved in the study have in common knowledge of text organization, causality, and reading strategies.

However, it is not assumed that they are necessarily equal in domain knowledge, topic familiarity, or reading ability.

*Domain knowledge.* Royer, et al. (1996) argue that domain knowledge accumulates as learners go through a process of “compiling chunks of knowledge into larger chunks .... [which] enables information acquired in particular contexts to be generalized to situations that differ in some degree from situations previously encountered” (p. 376). Novices in a domain first develop the ability to comprehend the surface meaning of a text, and as their expertise in the domain develops, they develop the ability to use this knowledge to “relate text information efficiently to other information they have acquired in the domain” (p. 377). Royer et al. see the ability of the reader to activate this highly developed knowledge network as “beneficial when formulating both online (at the time of comprehension) and postlearning inferences” (p. 378). In a study that examined the role of domain knowledge in the processing of a narrative passage about baseball, Chiesi, Spilich, and Voss, (1979) used high- and low-knowledge (in the domain of baseball) subjects to demonstrate that, following the reading of a narrative passage about baseball, high-knowledge subjects recalled a greater number of propositions than did low-knowledge subjects ( $F(1, 44) = 14.53, p < .001$ ). In a study by Voss, et al. (1980), both baseball experts and baseball novices generated baseball stories. High-knowledge subjects recalled the stories better than did the low knowledge subjects when experts wrote the stories, but there was no difference when novices wrote the stories. These findings suggest that the amount of domain knowledge individuals possess influences the level at which they process text. Graesser and Zwaan (1995) have argued from a theoretical perspective, however, that in the case of expository texts in an

unfamiliar domain, “there is virtually no knowledge to supply knowledge-based inferences” (p. 122). According to Royer, et al. (1996), “... expert college-age readers who know very little about science would have difficulty comprehending the surface meaning of an intermediate-level physics or chemistry text” (p. 377). In this present study, it could not be assumed that the university-age psychology students comprising the subjects possessed the domain knowledge necessary to read secondary-school-level history texts.

*Topic familiarity.* Many studies have examined the role of prior knowledge or topic familiarity on readers’ ability to comprehend text and generate inferential information (Spyridakis & Wenger, 1991). For example, Pearson, et al. (1979), in their investigation of the effects of strong or weak prior knowledge of a topic, concluded that subjects with strong prior knowledge were able to infer implicit relationships. In a study that examined the role of knowledge, writing style, and reading skill in the processing of expository text, Moravcsik and Kintsch (1993) manipulated topic familiarity by giving subjects three passages to read (one expository; two biographical) in which either a familiar title or no title was presented with the passage. Based on the analysis of reproductive recalls, the researchers found significant main effects due to the presence or absence of a title for both the expository passage ( $F(1, 95) = 19.38, p < .001$ ) and the biographical passages ( $F(1, 95) = 5.91, p < .05$ ). Analysis of reconstructive recalls of information in the biographical passages enabled the researchers to distinguish between superficial and deep levels of understanding. Though the total number of elaborations was roughly the same, “the likelihood that an elaboration was erroneous was twice as high when subjects could not use their knowledge about that famous person than when

they could .... This interaction was statistically significant,  $\chi^2(1) = 9.28, p < .01$ .” (p. 369). Topic familiarity, therefore, influenced the level at which the subjects processed both expository and biographical text.

For purposes of this study, then, both familiar and unfamiliar topics were needed in order to determine the role of goal orientations in text processing. Prior to the subjects' participating in the experimental portion of the study, it was necessary to determine the familiarity of the passages to be used in the experimental treatments. A method of selecting *arbitrarily* both familiar and unfamiliar passages was employed by Moravcsik and Kintsch (1993), but Spyridakis and Wenger (1991) argue “subject responses are better indicators of subject familiarity than an investigator's analytical assessment” (p. 357). According to Spyridakis and Wenger, existing methods of controlling for the effects of topic familiarity have not been demonstrated to be valid or reliable. Researcher assumptions about the familiarity of the topics in the present study, therefore, could not be presumed to reflect the students' topic familiarity. The method of selecting a pool of familiar and unfamiliar passages was based upon the procedure described in Spyridakis and Wenger “that uses the topic familiarity responses of one sample to predict the topic familiarity responses of the experimental sample” (p. 357). They argue that their proposed empirical method both enables researchers to control threats to internal and external validity, including (a) the possible priming effect of a pre-test, (b) the variations in subjects' ability to produce responses indicative of topic familiarity, and (c) the variations in subjects' skills or intelligence, and also enables researchers to maintain “an empirical link to the familiarity of representative members of the subject population” (p. 357). According to Spyridakis and Wenger, this method of

assessing topic familiarity was “successfully used by the first author and subsequently employed by the second author in order to test its robustness” (p. 357).

*Reading ability.* Moravcsik and Kintsch (1993; see also Perfetti, 1989) argued that “differences in reading skill, over and above knowledge differences, may be a factor in comprehension” (p. 362). In their study, Moravcsik and Kintsch assessed with the *Nelson-Denny Reading Test* (Brown, Bennett, & Hanna, 1981) each subject’s reading ability prior to the experimental manipulation. Results of the analysis of data demonstrated main effects due to reading ability ( $F(1, 95) = 4.08, p < .05$ ). In the study, the skilled readers performed better than did less skilled readers, regardless of topic familiarity. A study by Pearson et al. (1979) examined the effect of low- and high reading ability on deep processing. The results indicated that reading ability influenced their subjects’ abilities to process texts at deeper levels.

#### *Motivation and text-based learning*

As early as 1762, the French philosopher Rousseau believed that any method of teaching reading would be adequate given sufficient motivation on the part of the reader (McKenna & Kear, 1990). Past explanations of the role motivation plays in reading viewed motivation as a *product* accompanying comprehension (Guthrie & Wigfield, 1997; Mathewson, 1994; Meyer & Turner, 2002) rather than as a *process* directly affecting comprehension. Motivation was conceptualized both in terms of particular global traits such as intrinsic or extrinsic motivation (Spaulding, 1992) and affective variables such as attitude toward reading and interest in reading (Mathewson, 1994). Attitude and interest were believed to produce a motivational state in which individuals

develop an intention to read (Mathewson, 1994; Spaulding, 1992), are motivated to pick up books and read (Cramer & Castle, 1994; Guthrie & Wigfield, 1997), and, while reading, develop the intention to continue reading (Mathewson, 1994). However, research into attitude has failed to demonstrate an empirical connection between attitude and specific behaviours (Ajzen, 1989) and Mathewson (1994) extended this finding to argue that attitude did not predict either attention to or comprehension of reading selections and, according to Hidi and Baird (1988), "... few researchers have been directly concerned about how interestingness influences the comprehension and recall of expository text" (p. 468). Research suggests that comprehension of high-interest material is superior to comprehension of low-interest material (Asher, 1980; Shirey & Reynolds, 1988) and Alexander, et al., (1994) have noted that readers process information at deeper levels when they have a personal interest in a knowledge domain. Hidi and Baird (1988) argued that using modifying text through the insertion of attention-getting content to produce interest "does not necessarily facilitate, and may even inhibit, the recall of important information in exposition" (p. 480). Asher (1980) argues that interest and knowledge are confounded in real reading situations, so the basis for the interest effect is remains unclear.

Theorists, researchers, and classroom teachers have long accepted there exists an *indirect* relationship between motivation and reading comprehension (e.g., Athey, 1985; Cramer & Castle, 1994; Guthrie & Wigfield, 2000; Mathewson, 1994; Wigfield & Asher, 1984). Other researchers have argued that motivation plays an important role in drawing inferences and elaborating on text but have not explained why this is the case (e.g., Dole, et al., 1991; Magliano, et al., 1999; O'Brien, et al., 1988; van den Broek, Fletcher, &

Risden, 1993). Previous cognitive explanations of reading have sometimes mentioned motivation in their explanations of research results, but motivation as an intervening variable was seen as not theoretically important (Graesser & Zwaan, 1995; Mathewson, 1994), referred to in passing, or conceptualized as a construct external to the individual. For example, Mathewson (1994) argues against developing a motivational theory of reading and opts instead for conceptualizing motivation as the “development of conditions promoting intention to read” (pp. 1138-1139). Magliano, et al. (1999) provided empirical support for predictive inferences (i.e., predicting what comes next in text) and argued that “to achieve this kind of understanding, readers must be motivated to do so” (p. 625) but failed to indicate what precisely will motivate readers to do so. O’Brien, et al., (1988) argued that a reader “must be motivated to complete” elaborations not essential to comprehension and suggested that this can be accomplished by providing the reader “with a rich context within which to incorporate an inference” (p. 410). Dole, et al. (1991) argued that providing students with explicit information about strategies “can help motivate students” (p. 254) but did not indicate the specific role that motivation plays in comprehension processes. van den Broek, Fletcher, and Risden (1993) argued that “highly motivated readers can be expected to engage in more inferential activity than unmotivated readers” (p. 173) but did not explain why. The literature and the research remains unclear on the precise role that affective and motivational variables play in comprehension and hence, it is assumed that the cognitive processes associated with reading remain unaffected by motivation itself.

According to Graesser, et al. (1996; see also van Dijk & Kintsch, 1983), however, it is not meaningful to conceptualize reading in the absence of a goal and many reading

theorists (e.g., Graesser & Kreuz, 1993; Graesser & Zwaan, 1995; Lorch & van den Broek, 1997; Singer, 1988; van Dijk & Kintsch, 1983; Voss, 1986) assert that reading, to be conceptualized meaningfully, must attend to how a reader's goals influence text processing. Constructionist theories of reading comprehension (Graesser & Kreuz, 1993; see also, Graesser, Singer, & Trabasso, 1994; Graesser & Zwaan, 1995; cf., McKoon & Ratcliffe, 1992) conceptualize reading as a cognitive process in which readers routinely construct globally coherent representations by accessing knowledge to elaborate upon the explicit text. Readers "have an inherent proclivity to ... construct meaning representations at the deepest and most global levels that can be supported by the text, their reading goals, and their background world knowledge" (Graesser Swamer, Baggett, & Sell, 1996, p. 16). Graesser and his colleagues (e.g., Graesser & Kreuz, 1993; Graesser, Singer, & Trabasso, 1994; Graesser, et al., 1996; Graesser & Zwaan, 1995) propose that a reader's *effort after meaning* (Bartlett, 1932) leads to mental representations "that are the products of more active processing mechanisms ... that address a readers [sic] goals" (Graesser & Zwaan, 1995, p. 127). A key presumption of this theory is the "reader goal assumption" (Graesser & Zwaan, 1995, p. 123) in which "strategic comprehension ... is driven by particular reader goals" (p. 127; see also McKoon & Ratcliffe, 1992). From the constructionist perspective, then, goals are an important determinant of a reader's processing strategies (Just & Carpenter, 1980; Lorch & van den Broek, 1997).

The constructionist perspective is, however, somewhat incoherent in its predictions about the on-line generation of inferences. Despite the declaration that "...individuals frequently read a text for a particular purpose" (Graesser & Kreuz, 1993,

p. 151), these researchers focused on predicting inference generation in which "...the reader has no particular purpose in reading" (p. 157). Nevertheless, even in situations in which the reader reads "incoherent expository text on a very unfamiliar topic for no particular purpose" (p. 156), the theory predicts that readers generate both on-line causal antecedent inferences (i.e., "the inference is on a causal chain [bridge] between the current explicit action, event, or state and the previous passage content", [p. 149]) and thematic inferences (i.e., "the main point of the text" [p. 149]). These are the two types of inferences that history teachers would require of their students. According to Graesser and Kreuz, when the reader reads with a particular purpose in mind, "...the theory does not offer decisive predictions about which classes of inference are generated on-line" (p. 157).

According to Graesser and Zwaan (1995), fluctuations in readers' goals are not a problem theoretically (see Rowell, et al. [1990] for a contrary viewpoint). Graesser and Zwaan's viewpoint, however, is derived from three assumptions: first, that the reader's goal is unitary in nature; that is, the goal is to process text deeply and this goal is constrained by the nature of the text and the reader's background knowledge; second, that the constructionist theory accounts for "deeper levels of comprehension ... rather than shallow levels of comprehension" (Graesser, et al., 1996, p. 1), and third, that a shallow level of understanding is a product of the automatic execution of linguistic elements in the text (Graesser, et al., 1996; Long, et al., 1996). Part of the problem here is theoretical – knowledge structures, in the constructionist perspective, "are activated via pattern recognition processes by explicit content words, combinations of content words, and interpreted text segments" (p. 147) and goals are "elicited by a particular text genre"

(p. 157); that is, goals are not seen as cognitive in origin. Part of the solution, therefore, is to determine the nature of the reader's goals from a cognitive perspective. Graesser and Kreuz (1993) suggest that researchers need to identify "the typical goals of readers when they read texts in different genres" (p. 157).

In the classroom, it has been assumed that a reader's goals are unitary; that is, the reader's goals are the same as the teacher's curricular goal of understanding course content (Voss, 1986). However, Mathewson (1994) argues "people develop personal goals for a variety of reasons, including their own values and purposes suggested by others" (p. 1147). Therefore, it "cannot be assumed ... that externally suggested purposes are always sufficiently accepted to become personal goals" (p. 1147) or that a reader's goal is to process text at the deepest and most global levels. That is, goals are not unitary in nature. According to Rowell, et al. (1990), "... different goals result in the construction of different meanings" (p. 42). From this follows the argument that shallow levels of comprehension emerge from a reader adopting goals that lead to the selection of surface-level processing strategies; a constructionist theory that accepts fluctuations in goals can explain shallow levels of comprehension. If a reader's effort after meaning is dependent upon goals, then individual differences that cause fluctuations in goals will make a difference theoretically.

Nolen and Haladyna (1990a; see also Lapadat, 2000) have argued that motivation should not be conceptualized as a unitary construct. A model of reading developed from the constructionist perspective must have a component that accounts for fluctuations in readers' goals. If a reader's goal is not unitary, how are a reader's goals to be conceptualized? Early goal theory (e.g., Ford, 1992) purported to explain the role of

motivation in all human behaviour. In response to these early goal theories, educational psychologists developed the construct of *goal orientation* “to explain children’s learning and performance on academic tasks and in school settings” (Pintrich & Schunk, 2002, p. 213). A goal orientation comprises an integrated set of beliefs that leads to “different ways of approaching, engaging in, and responding to achievement situations” (Ames, 1992, p. 261). Many theorists and researchers have proposed that differences in achievement behaviour can be explained by contrasting *goal orientations* (e.g., Ames, 1992; Dweck & Elliot, 1983; Nichols, Patashnick & Nolen, 1985; Meece, et al., 1988).

Although the literature identifies many types of goal orientations (e.g., *learning* and *performance* goals [Elliot & Dweck, 1988]; *task-involved* and *ego-involved* goals [Nicholls, 1984]; *task* and *ego* orientation [Nolen & Haladyna, 1990a, b], and *mastery* and *performance* goals [Ames, 1992]), there is enough conceptual overlap such that a consensus has emerged as to relevant properties. In much of the current literature (e.g., Ames, 1992; Dweck & Elliot, 1983; Nichols, et al., 1985; Meece, et al., 1988; Nolen & Haladyna, 1990a, b), the terms *mastery* and *performance* have been used to denote the two general goal orientations. These studies, however, focused on correlations between individual and situational variables and the students’ reported use of strategies, and did not determine if the goal orientations directly influenced the processing of text. Guthrie and Wigfield (2000; see also Alexander & Jetton, 2000) argue that goal orientations are related to deep processing of texts, but their argument is philosophically and theoretically based and they provide no research evidence that goal orientations influence text-based learning. However, individual and situational variables directly influence the goal

orientations adopted by learners and it is reasonable to suggest that these variables subsequently and directly influence strategic processing behaviours during reading.

### *Goal orientations and cognition*

Schutz (1994) argues that motivation can be conceptualized “in terms of the direction of thought and behavior” (p. 136) and proposes that our thoughts and behaviours are directed toward “the goals ... we attempt to attain” (p. 137). According to Meece, et al., (1988), “... students’ engagement in achievement activities is motivated by a complex set of goals” (p. 514). For purposes of this study, students who value understanding for its own sake adopt a *mastery goal orientation*; students who wish to demonstrate high ability relative to others adopt a *performance goal orientation* (Ames, 1992; McInerney, Roche, McInerney, & Marsh, 1997). Central to the concept of a mastery goal orientation is the “belief that effort will lead to success or a sense of mastery” (Ames, 1992, p. 262; see also Ames & Archer, 1988). According to Jagacinski and Nicholls (1987), students whose goal is to master content feel pride in the academic success that emerges from effort. The general premise derived from these results is that students whose goal is mastery “believe more in the efficacy of effort, ... work harder and therefore experience more positive outcomes” (Graham & Golan, 1991, p. 187). The concept of a performance goal orientation, in contrast, “focuses on one’s ability and sense of self-worth ... as evidenced by doing better than others ... or by achieving success with little effort” (Ames, 1992, p. 262) and “learning is perceived as a means to an end” (Meece, et al., 1988, p. 515). According to Meece, et al., “both types of goal orientation represent a form of approach motivation” (p. 521) and these goal orientations are

“presumed to guide students’ behavior, cognition, and feelings as they become involved in academic work” (McInerney, et al., 1992, p. 208; see also Meece et al., 1988).

Research has demonstrated that differences in goal orientations can influence students’ choice of achievement tasks (Ames, 1992; Dweck & Elliot, 1988). According to Nolen and Haladyna (1990b), “...task [mastery goal ] orientation embodies a goal of understanding ... and a willingness to expend the required effort” (p. 127). Nolen and Haladyna (1990b) examined personal and environmental influences on students’ beliefs about effective study strategies and argued that although their data were correlational, “students’ goals ... and their perceptions of teachers’ goals ... relate [causally] to their subsequent task orientation, as well as to beliefs in the value of effective strategies” (p. 216; see also Nolen & Haladyna, 1990c). This research, however, was based on surveys and students’ self-reports of task choice and did not determine if goal orientations mediated between their beliefs and their strategic processing behaviours during the processing of texts.

*Methodological considerations.* According to Jaeger (1990), however, individuals involved in surveys often respond to questions with what they consider to be socially-acceptable responses; that is, they respond in the way they think the person conducting the survey wishes them to respond. While the evidence supports the relationship between the students’ beliefs about their behaviours in academic situations, it cannot be determined if these beliefs reflect accurately the empirical reality of a situation in which students learn from texts.

Graham and Golan (1991) sought to make inferences about the relationship between goal orientations and processing strategies occurring during reading, but used

memory measures taken after reading to draw their conclusions. According to Lorch and van den Broek (1997), however, "... research since the early 1970s has made it abundantly clear that memory measures taken after reading are all too indirect as indicators of processes occurring during reading" (p. 215). According to Keenan, et al. (1990), memory measures taken after reading "do not allow one to determine whether the inference occurred during comprehension or as a result of the test" (p. 382). Some researchers (e.g., McKoon & Ratcliffe, 1992) have implied that knowing when an inference is drawn is neither important nor decidable, but others have argued that "we need to know which types of gaps [listeners and readers] can handle, that is which types of inferences they can draw without being prompted to do so" (Keenan et al., 1990, p. 395). Because students must read texts independently (i.e., without prompts), it is important to know the type of processing (shallow or deep) that occurs during reading; specifically, whether deep processing occurs on-line during reading or off-line following reading.

On-line measures of sentence reading times have in the past been used as indicators of comprehension processes occurring during reading. According to Graesser, et al. (1996), research into levels of processing has demonstrated that "deep levels often have greater impact on reading time ... than do the shallow levels" (p. 1). This empirical observation emerges from the assumption that it "takes more time and processing resources to access and utilize information from specific knowledge structures because they are not over-learned and automatized" (Graesser & Zwann, 1995, p. 119). To obtain on-line measures of sentence reading times, several methods have been employed: (a) eye movement methods (e.g., Just & Carpenter, 1980); (b) the single-word procedure (e.g.,

Aaronson & Ferries, 1984; Just, Carpenter, & Wooley, 1982); and (c) the single-sentence procedure (e.g., Graesser & Riha, 1984). Several factors obviated the use of the first three methods in the present study. First, the collection of eye-movement data involves the use of sophisticated and expensive camera equipment (Mitchell, 1984) that was not available to many researchers which requires a great deal of expertise to use (Aaronson & Ferries, 1984) that the researcher did not possess. Second, the reading times of single-words appear subject to spillover effects such that the processing time of any word  $n$  is influenced by the processing time of word  $n - 1$  (Mitchell, 1984). Third, the method also lacks congruence with the present study's interest in passage-level processing in natural texts.

The single-sentence method was selected for use in this study. This method is relatively inexpensive (Aaronson & Ferries, 1984), the spillover effects from sentence to sentence in sentence-reading times is believed to be insignificant (Mitchell, 1984), and the collection and analysis of the data is relatively straight-forward and can be accomplished with readily-available technology and data analysis computer programs.

It has been demonstrated that "if readers encounter a statement that contradicts information established earlier in a text, they are generally slow to process the statement and they attempt to construct some resolution of the contradiction" (Lorch & van den Broek, 1997, p. 220). This suggests that if a reader had constructed a causal relationship while reading a history text in which the relationship was implicit, a statement that contradicted the implicit relationship would be processed more slowly if the reader was oriented toward deep rather than shallow processing. According to Just and Carpenter (1987), "a reader's failure to detect a factual inconsistency in a text can indicate

incomplete processing at the [deep] level”(p. 219). Therefore, no difference in reading times between a no motivational or task manipulation control version and a motivation manipulation version that induced deep processing would suggest that the text had been processed at a shallow level. A methodology that used contradictory statements, therefore, had the potential to reveal differences between deep and shallow processing.

One of the assumptions associated with on-line methods of measuring inference generation is that it is not necessary to independently assess the subject's level of inference construction (Haberlandt, 1984). A second measure, however, does provide evidence of inference generation when the measure converges with increased reading times (Singer, 1993). It also provides a measure of inference generation following comprehension if there is no increase in reading times for the contradictory statement. Lastly, it provides converging evidence along with significant differences in reading times that subjects have not engaged in an exercise of “rapid button-pushing” during the computer task. The on-line methodology has been criticized from a theoretical perspective (e.g., McKoon & Ratcliffe, 1992) because it does not indicate the type of processing that is occurring on-line (e.g., inferencing). However, Littlejohn (1992) points out that all cognitive research involves indirect observation and a great deal of inference and Haberlandt (1984) argues that “nobody actually claimed that reading times by themselves reveal comprehension processes directly” (p. 220). Haberlandt suggests that these on-line measures can be used “in conjunction with measures obtained using other methods such as question-answering” (p. 221) to evaluate hypotheses about processing.

Graesser and Goodman (1985) employed a *why* and *how* question-answering method in experiments they designed to expose “underlying passage structure ... for

expository prose” (p. 125). According to Graesser and Goodman, “these questions elicit many inferences” (p. 125). Other research has also used question asking to elicit information about inference generation. Prior to collecting time-based behavioural measures from their subjects, Graesser and his colleagues (Graesser, 1981; Graesser & Clark, 1985; Graesser & Goodman, 1985; Graesser & Zwaan, 1995) collected question-answering protocols from subjects to expose their ability to deeply process text. These researchers argued that *why* questions “elicit ... causal antecedents” (Graesser & Zwaan, 1995, p. 125). Answers to *why* questions have also been used to measure subjects’ inference generation after subjects have read a passage and used to measure inference generation during the reading of a passage in which the causal relationships were not explicit (e.g., Pearson, et al., 1979; Zinar, 1990). To provide a second dependent measure of both shallow and deep processing, subjects were asked *what*, *how*, and *why* questions which probed for memory of both the explicit text and the implicit relationships that are hypothesized to exist between historical events. This present study, therefore, used both reading times of sentences and question-answering protocols to provide converging evidence of the role of goal orientations in text-based learning.

#### *Individual and situational variables and goal orientation*

Cognitive theories of motivation maintain that students “hold beliefs about ability and effort [that] affect the kinds of goals they set” (Woolfolk, 1993, p. 348) and “respond not to external events ... but rather to their interpretations of these events” (p. 339). Various individual and situational variables are therefore understood to influence the goals students adopt and the effort they will make in achievement activities (Meece, et

al., 1988). Individual differences in self-perceptions of ability and competence “can predispose students to adopt a particular goal orientation in learning activities” (Meece, et al., 1988, p. 515) and these goal orientations both “directly influence cognitive engagement and ... mediate the effects of individual difference variables” (Meece, et al., 1988, p. 516).

According to Graham and Golan (1991), a performance goal context “connotes highly evaluative situations in which the emphasis is on competition with others” (p. 187). Jagacinski and Nichols (1984, 1987) argue that a performance goal orientation is associated with a judgement that one lacks ability and this orientation can emerge when success is achieved with little effort (Jagacinski & Nicholls, 1984) and when negative feelings develop following failure (Jagacinski & Nicholls, 1987). In these circumstances, individuals with low self-perceived ability are likely to develop a performance goal orientation “involving social approval and reinforcement” (Meece et al., 1988, p. 515) and attention “is directed toward achieving normative defined success” (Ames, 1992, p. 262). Motivational patterns associated with performance goal orientation include avoidance of challenging tasks (Dweck, 1986) and negative affect following failure, accompanied by a judgement that one lacks ability (Jagacinski & Nichols, 1987). According to Ames (1992), self-perception of ability “is a significant mediator of cognitive, affective, and behavioral variables when students are focused on doing better than others, but not when they are focused on trying and learning, as a mastery goal orientation” (p. 263; see also Dweck, 1986). Thus, a performance goal orientation, a motivational state “found to have detrimental consequences for performance” (Graham &

Golan, 1991, p. 193), emerges from an emphasis on external reinforcement and normative evaluation (Meece, et al., 1988).

A mastery goal orientation, however, is characterized as a motivational state in which students “prefer challenging tasks and seek out opportunities that allow them to satisfy needs for competence, curiosity, and mastery” (Meece, et al., 1988, p. 515). These students believe that “effort will lead to success and a sense of mastery” (Ames, 1992, p. 262). Individuals who “develop positive self concepts of ability tend to have high expectations, to persist longer at difficult tasks ... and to display high levels of task engagement” (Meece, et al., 1988, p. 515). These individuals apply effective learning strategies (Ames, 1992) and their use of these strategies is mediated by the belief that effort leads to success (Garner, 1990). Research has indicated that perceived ability is only weakly related to a mastery goal orientation (Nicholls, et al., 1985; Nolen, 1988; Nolen & Haladyna, 1990b). Self-perceptions of ability, therefore, influence cognition and behaviour only when students “are focused on doing better than others but not when they are focused on trying and learning, as a mastery goal orientation” (Ames, 1992, p. 263). According to Ames, “effort-based strategies are more likely to occur when students are focused on mastery goals” (p. 262). The use of these strategies is contingent upon the belief that effort leads to success and that failure can be remedied by a change in strategy (Garner, 1990).

Students’ perceptions of the instructional demands associated with the learning situation, however, can also “make different goals salient” (Ames, 1992, p. 263; see also Ames & Archer, 1988). Ames (1992) argues that embedded in the design of academic tasks and learning activities “is information that students use to make judgments about

their ability [and] their willingness to apply effortful strategies” (p. 263). According to Meece, et al. (1988), these situational demands “can override individual differences in behavior patterns, rendering them less powerful and influential” (p. 516). It is also possible that a mastery goal orientation results not in generalized effort but in the students’ selection of strategies based on their interpretation of particular task demands (Graham & Golan, 1991; Humphreys & Revelle, 1984). Graham and Golan (1991) argued the possibility that “stable individual differences in the tendency to be task- [mastery goal ] oriented or ego- [performance goal ] oriented exert their own independent effects on the processing of complex verbal material” (p. 191). Classroom tasks that are interpreted as requiring more effort (e.g., understanding implicit causal relationships between historical events) will lead students with a mastery goal orientation to select deep processing strategies (e.g., combining information from different parts of the text or combining information from the text with prior knowledge) that result in a richer understanding of the events explicitly described in the text (Kintsch, 1992). In contrast, classroom tasks that are interpreted as requiring less effort (e.g., remembering the explicit event described in the text) may lead these same mastery-oriented students to the select different strategies (e.g., memorization of ideas and details) that result in a superficial understanding of the events described in the text (Kintsch, 1992). In these cases, there may exist an interaction between goal orientation states and the classroom tasks such that mastery-goal-oriented students perform better than do performance-goal-oriented students when the task requires more effort but not when the task requires less effort. Thus, student achievement behaviours emerge from the complex interactions between

individual and situational variables that differentially influence students to adopt either a mastery goal or a performance goal orientation.

### *Goal orientations and text-based learning*

The processing of text is differentially influenced by two contrasting sets of behaviours: *surface-level-processing strategies* (Nolen & Haladyna, 1990a) and *deep-processing strategies* (Nolen, 1987; Nolen & Haladyna, 1990a, b). Surface-level-processing strategies such as rehearsal or memorizing the explicit information in the text “are not seen as particularly effective for learning from text” (Nolen & Haladyna, 1990a, p. 116). Conversely, the “integration of new information and prior knowledge is at the heart of a set of behaviors that have been called ‘deep-processing strategies’” (p. 116). Ames (1992) suggests that these deep-processing strategies are “effort-based” (p. 262). Because strategies are “defined as goal-directed behavior” (Nolen & Haladyna, 1990b, p. 126), reading can be conceptualized as a goal-directed process in which the reader’s selection of either surface-level processing strategies or deep-processing strategies determines whether they develop either a superficial or deep understanding of the information in the text. According to Nolan and Haladyna (1990b), “students connect the goal of learning and understanding embodied in task [mastery goal] with the kinds of strategies likely to lead to that goal” (p. 127). Research has demonstrated that students endorsing mastery goals report valuing and using deep-processing strategies during the reading of texts (Nolen, 1988; Nolen & Haladyna, 1990a). Differences in goal orientations, therefore, can influence the selection of learning strategies such as elaboration, which is thought “to promote deep processing of textual information” (Nolen

& Haladyna, 1990b, p. 117). In contrast, Nolen and Haladyna (1990a) found that “correlations between valuing of these strategies and ego [performance goal] orientation ... were low or nonsignificant’ (p. 122). Other research has demonstrated that students who adopt a performance goal orientation do not value those deep-processing strategies associated with text-based learning (Nolen, 1988; Nolen & Haladyna, 1990a) and instead adopt “superficial or short-term learning strategies, such as memorization and rehearsal” (Ames, 1992, p. 263) during learning activities.

Recall that research has demonstrated that students of all ages, while reading expository texts, seem to be satisfied with shallow processing. It appears that students may not have developed, as a result of their schooling, the type of approach motivation that results in the selection of deep-processing strategies essential to fully understand text. Indeed, the focus on an external and normative evaluation that prevails in classroom settings may predispose students to adopt a maladaptive performance goal orientation and select processing strategies that lead to a superficial understanding of the texts they read. Students, however, are required to do a significant amount of independent reading. Many classroom teachers may assume that the inferences required to fully understand texts are either part of the automatically encoded memory representation or emerge as students strategically process text to the deepest levels (Graesser, et al, 1996; McKoon & Ratcliffe, 1992). It was important to determine if experimental conditions that encourage students to adopt either a maladaptive or an adaptive motivational pattern would influence their selection of either shallow processing or deep processing strategies during reading.

*Methodological considerations.* The role of goal orientations and strategy use in deep processing has been discussed previously in this study. Pintrich, et al. (1991) developed *The Motivated Strategies for Learning Questionnaire* (MSLQ) “to assess college students’ motivational orientations and their use of different learning strategies” (Pintrich, et al., 1993, p. 801). The MSLQ is based upon a general cognitive view of motivation and learning strategies with the student conceptualized “as an active processor of information whose beliefs and cognitions are important mediators of instructional input” (Pintrich, et al., 1993, p. 801). There are two sections to the MSLQ: a) a motivation section and b) a learning strategies section. Pintrich, et al. (1991) indicate the “scales on the MSLQ can be used together or singly” (p. 3). Two subscales of the motivations section have relevance for this study as they measure contrasting goal orientations: *intrinsic goal orientation* (a focus on learning and mastery), and *extrinsic goal orientation* (a focus on grades and approval from others). These two orientations (intrinsic and extrinsic) are synonymous respectively with mastery goal orientation and performance goal orientation. One subsection of the learning strategies also has relevance: the *control of learning beliefs* subscale concerns the students’ “regulation of their own effort (e.g., persisting in the face of difficult or boring tasks)” (p. 803). The subsections used remained intact, but the questions from the three subsections were modified by changing the words “in this course” to “in history class”. It was assumed that this change would not affect the validity of the data. According to its developers, two confirmatory factor analyses demonstrated the reliability and validity of the MSLQ’s theoretical framework and scales.

Graham and Golan (1991) used direct and controlled experimental conditions to examine separately the influence of motivational states and processing tasks on the recall of words in word lists. In their first experiment, Graham and Golan used a processing task to induce both shallow and deep processing of verbal material; in their second experiment, they demonstrated the power of “relatively benign ego manipulations to produce information processing differences” (p. 191) in verbal material. Learning a list, however, is not the same as learning from text (Kintsch, 1994) and it cannot be assumed that the conclusions drawn by Graham and Golan can be applied to situations in which individuals read connected text. According to Pearson, et al., (1979), “... validation in natural text is necessary prior to wide acceptance of a conclusion” (p. 202).

There are, however, theoretical, methodological and practical concerns associated with using history texts to determine the role of goal orientations in the shallow and deep processing of expository texts. Much of the theory and research that has examined inference construction has used narrative text for its materials. This is because it is believed that the knowledge necessary for inference construction in narrative text are induced by individuals as they listen to narrative stories as young children while the knowledge structures for expository text must be learned (Weaver & Kintsch, 1991). This theoretical perspective enabled researchers investigating processing of narrative texts both to argue that their subjects possessed the same knowledge and to avoid the messiness associated with controlling knowledge during experiments. The use of text analysis to predict inferences also provided researchers with a measure of inference construction that was independent of the reader. Researchers instead focused on the characteristics of text that enable inferences to be constructed. Graesser and Riha (1984;

see also Spiro, 1980) argued, however, that an adequate understanding of inference construction cannot emerge from a linguistic analysis of text and research using linguistic analyses of texts was unsuccessful in predicting which and how many inferences are drawn during comprehension (Vonk & Noordman, 1990). That is, no measure independent of the reader against which the actual inferences constructed may be compared emerges from data based on text analyses.

According to Graesser and Zwaan (1995), inferences constructed during comprehension of narrative text are knowledge-based, and there is no reason to assume that this would not be the case for history texts (or for other expository texts). Graesser and Zwaan imply as much when they state, "... in the case of expository texts on unfamiliar topics ... there is virtually no knowledge to supply knowledge-based inferences" (p. 122). It was therefore necessary to establish a method by which it could be determined independently of the subjects in the present study if the subjects possessed (or lacked) the knowledge necessary to deeply process the texts being read. Graesser and Riha (1984) also argued that the null result obtained in their experiments that used mean reading times of sentences to determine processing levels could be explained by individual differences in their subjects' familiarity with the topics. This suggested that from theoretical, research, and practical perspectives, a method that determined if the texts selected for the experimental treatments were either familiar or unfamiliar would provide an empirical measure against which the actual processing of the experimental subjects could be compared.

### *Summary*

Research has supported the role of text and knowledge in text-based learning, but has not demonstrated that these variables “explain” text-based learning (see Shalert, 1982; Whitney, 1987). The relationship between either or both text and prior knowledge and text-based learning is not orthogonal. The results of research have demonstrated that readers do not automatically apply prior knowledge appropriately to reading tasks and text does not automatically activate the knowledge structures necessary to learn from text (Dole, et al., 1991; McKeachie, et al., 1985; Perfetti, 1988; Vonk & Noordman, 1990; Whitney, 1987). This failure to independently apply knowledge has led to debate about access and utilization of the specific and general knowledge required to understand text (Whitney, 1987). Rubin, Bruce, and Brown (1976) argued that the problems learners encounter often do not result from a lack of knowledge but in the use of that knowledge; that is, in the use of appropriate and productive strategies during the processing of text. Knowledge of appropriate strategies, however, does not necessarily lead to better performance (McKeachie et al., 1985). The use of strategies to access and utilize knowledge during text processing instead appears to be dependent upon both knowing when and how to apply strategies (Ames, 1992; Paris, et al., 1983) and being motivated to use them (McKeachie, et al., 1985).

The predisposition of the cognitive view of reading to conceptualize motivation as a unitary and hypothetical construct and its concomitant failure to incorporate motivation as an intervening variable leaves the cognitive perspective at a philosophical and theoretical level and does not provide the explanatory power necessary for classroom teachers to make informed instructional decisions in the classroom. Recently, theorists

and researchers working from a motivational perspective (e.g., Pintrich & Schunk, 2002; Schutz, 1994; Sternberg, 1984, 1998) have conceptualized motivation and cognition as inextricably connected and some educators have begun to examine the role of motivational factors in text-based learning (e.g., Guthrie & Wigfield, 1997; Mathewson, 1994; Spaulding, 1992). The synthesis of motivation and reading theory is not yet complete, but the efforts of these theorists and researchers (e.g., Alexander & Jetton, 2000; Guthrie & Wigfield, 1997, 2000) have begun to illuminate a new path along which may advance those educators not satisfied with prevailing explanations about how students learn from text (see, e.g., Otto & White, 1982; Schallert, 1982; Wenestam, 1993; Whitney, 1987).

A goal mediation model of cognitive engagement (Meece, et al., 1988) suggests that individual differences in students self-perceptions of ability and competence and their perceptions of instructional demands may influence students to adopt either a mastery or a performance goal orientation (Meece, et al., 1988) that affects their selection, during reading, of either surface-level- (Nolen & Haladyna, 1990a) or deep-processing strategies (Nolen, 1987). A goal mediation model, when synthesized with a constructionist theory of text-based learning (Graesser, et al., 1996), has the potential to explain both what is learned or remembered following the reading of texts (i.e., different levels of understanding) and how the outcomes might be explained in terms of motivation. It is therefore not a question of whether text, knowledge, motivation and situation are influential in the reader's understanding of text; such influences can be assumed (Alexander, et al., 1994). Rather, it is a question of how individual and situational variables associated with motivation influence a reader's adopting a particular

goal orientation that subsequently controls the reader's selection of either surface-level-processing or deep-processing strategies during the reading of texts.

Previous studies by Nolen and her colleague (Nolen, 1988; Nolen & Haladyna 1990a, b) found high correlations between mastery goal orientations and valuing and using deep-processing strategies during the reading of texts (Nolen, 1988; Nolen & Haladyna, 1990a) and low correlations between these strategies and performance goal orientations (Nolen & Haladyna, 1990a). Interpretations of the relationship between goal orientations and learning strategies have been derived from correlational data, but the hypothesis that goal orientations are the causal link between motivational states and text-based learning requires direct and controlled experimental conditions (Lorch & van den Broek, 1997; Nolen & Haladyna, 1990b). This present study extended the work of Nolen and Haladyna (1990a; b) and Graham and Golan (1991) by manipulating together both motivational state and processing task to determine if the individual differences in behaviour patterns that emerged had demonstrable consequences on the processing of history text.

### *Research Questions*

The following research questions were formulated from the findings of the research studies reviewed. Each question identifies those variables (text familiarity, motivational state, and processing task) that are believed to influence text-based learning.

1. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), are there differences between the experimental groups in the recall of textually-correct thought units?

2. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), are there differences between the experimental groups in the recall of situationally-correct thought units?
3. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), are there differences between the experimental groups in the reading times of sentences that contradicted an inference that should have been drawn?

The use of a 2 x 2 factorial design also allowed me to test the possibility that main effects or interactions were present. These alternate questions were tested statistically only when analysis of the data indicated that a test of main effects and interaction was appropriate. They are stated as follows:

4. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), is there a main effect due to motivational states, but no main effect for processing task and no interaction?
5. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), is there a main effect due to processing task, but no main effect for motivational state and no interaction?

6. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), is there an interaction between motivational states and the processing task such that mastery-goal-oriented subjects perform better than performance-goal-oriented subjects when they interpret the task as requiring more effort (i.e., deep processing) but not when the task requires less effort (i.e., shallow processing)?

## CHAPTER 3

### *Method*

#### *Design*

This study employed a 2 x 2 factorial between groups and truncated control group design with subjects randomly assigned to both the control group and the treatment conditions for the processing task and motivational manipulation. A previous experiment (Graham & Golan, 1991) examined separately the influence of motivational states and cognitive processing tasks on the processing of simple verbal material. The use of a 2 x 2 factorial between groups and control group design allowed me to study both the independent effects associated with motivational states and processing tasks and a possible interaction between the two (Jaeger, 1990).

There were two independent variables: (a) motivational state (mastery goal orientation vs. performance goal orientation), and (b) processing task (surface-level processing vs. deep processing). It has been argued (e.g., Guthrie & Wigfield, 2000) and research has demonstrated (Nolen & Haladyna, 1990a, b) that these variables have been associated with either shallow or deep processing of texts.

There were two dependent variables: (a) reading times of sentences comprising a contradiction of an implicit causal relationship that was assumed to exist between events described previously in the texts (Lorch & van den Broek, 1997), and (b) the inclusion, in cued recall verbal protocols, of both pragmatically-acceptable situationally-correct thought-units that elaborated upon the explicit text (Moravcsik & Kintsch, 1993; see also Graesser, 1981; Graesser & Clark, 1985; Graesser & Goodman, 1985; Zinar, 1990) and

textually-correct thought-units that comprised the gist of the passages . It is believed that both measures differentiate between deep and shallow levels of understanding (Graesser & Riha, 1984; Graesser & Zwaan, 1995). The design of the study is illustrated in Table 1.

Table 1.

*Design – 2 x 2 Factorial Plus Truncated Control*

		Motivational State	
		Mastery Goal Orientation	Performance Goal Orientation
Experimental Task	Shallow Processing	Group A (MGO+SP)	Group D (PGO+SP)
	Deep Processing	Group B (MGO+DP)	Group E (PGO+DP)

Group C (Control)
----------------------

This experimental design enabled me to test different individual and situational conditions that may exist in many classrooms. Students may have adopted, in response to personal beliefs about ability, a mastery goal orientation to learning but may also interpret the classroom as one in which either shallow processing or deep processing strategies are encouraged by the teacher. Conversely, the student may have adopted a performance goal orientation but may also interpret the classroom as one in which either shallow processing or deep processing strategies are encouraged by the teacher. Other

students may have no particular goal orientation (or a goal orientation such as work avoidance) but will still be influenced by the environment. The 2 x 2 factorial between groups and truncated control group design permits me to test all possibilities.

### *Setting*

The experiment took place at a small British Columbia university. The laboratory area in which the research took place was located in a building at the university. The laboratory rooms were located along one side of a corridor (signs at the entrance to the corridor asked students to remain quiet while in the hallway). There was a vestibule outside the laboratory room to which I was assigned. A table was set up in the vestibule with a poster on the wall comprised of examples of pre-test materials and instructions for completing the pre-test activities. The pre-test materials (vocabulary test, stopwatch, MSLQ survey, and pencils) were on the table. The demographic information, the answer sheets for the vocabulary test, and the MSLQ survey were all contained in a four-page booklet.

### *Sample*

The sample for the study was drawn from four classes of first- through fourth-year students in the psychology and arts and sciences programs of the university. The chair of the program was approached to determine if students in the psychology classes at the university could be solicited to volunteer for the experiment. The chair granted me permission to approach faculty members and students in several of the program's psychology classes. After receiving permission from the chair of the program and the program's classroom instructors, I contacted the students in the classes. The nature of the

experiment was described briefly, the concept of informed consent was discussed, and sign-up sheets were left with the classes (see Appendix A). The program has a policy that rewards students participating in psychology experiments by granting up to four (4) percentage marks to be applied to course credit. However, to ensure that the reward is not excessive, students receive .5 of a percent for each half hour of participation (this resulted in 1 percent being awarded for each student participating in the study). The classroom instructors advised the students of the psychology department's grade incentive for participating in university experiments. Following each class, I returned to obtain the sign-up sheets and the classroom instructors were asked to advise those students not in attendance, at the next scheduled class, that sign-up could take place any time up to the completion of the experiment. A total of 205 students volunteered and 133 (64.8%) participated in the experiment (72 volunteers withdrew prior to the experiment).

Of the 133 subjects participating in the study, 118 were randomly assigned to four treatment groups and a control group. The remaining 15 subjects comprised a non-experimental cohort that, prior to the start of the experiment, determined the topic familiarity of passages used in the experiment. (In this study, the term *treatment groups* refers to the four groups that received the motivational state and processing task inducement. The term *experimental groups* comprises the combined treatment groups and the control group. The *non-experimental cohort* comprises the 15 participants used to determine the topic familiarity ratings for the experiment.) Random assignment in this study was accomplished through the subjects selecting the time at, and date on, which they would participate; on arrival at the research laboratory, those attending were assigned in order to one of four treatment groups or to the control group. The four

treatment groups and the control group were ordered *A* to *E*, and the subjects were assigned to a group in the order of the groups. That is, the first subject to arrive was assigned to Group A (Shallow Processing + Mastery Goal Orientation), the second subject to Group B (Deep Processing + Mastery Goal Orientation), the third subject to Group C (control group), the fourth subject to Group D (Shallow Processing + Performance Goal Orientation), and the fifth subject to Group E (Deep Processing + Performance Goal Orientation). The sixth subject was assigned to Group A; the seventh subject to Group B, and so on. This procedure was followed until all 118 subjects had been tested. The results of the assignment are presented in Table 2.

Table 2.

*Numbers and Gender of Subjects Assigned to Groups*

Group <sup>1</sup>	Gender		N
	Female	Male	
Non-experimental cohort	10	5	15
A (SP + MGO)	19	5	24
B (DP + MGO)	16	8	24
Control	12	12	24
D (SP + PGO)	20	3	23
E (DP + PGO)	20	3	23
Total	97	36	133

*Note 1:* : SP = Shallow Processing Task; DP = Deep Processing Task; MGO = Mastery Goal Orientation; PGO = Performance Goal Orientation

### *Materials*

For this study I identified, in consultation with two classroom history teachers, a total of 10 history topics covered in Grade 11 and 12 history classrooms: five topics which the teachers agreed received “a great deal of attention” (familiar topics) and five which they agreed “received very little, if any, attention” (unfamiliar topics) in class. Based on the topics identified, I selected 10 passages from the available classroom textbooks; one for each of the topics identified in the discussion.

*Familiar and unfamiliar texts.* I first summarized on individual index cards each of the passages into four or five sentences and an accompanying title (Spyridakis & Wenger, 1991). The 15 subjects comprising the non-experimental cohort were used to predict the topic familiarity responses of the experimental sample. The cohort was not advised of its status; when the participants comprising the cohort arrived at the laboratory, they were administered the pre-tests and then assigned the sorting task to determine the familiarity ratings of the texts to be used in the experimental portion of the study (each participant comprising the cohort completed the tasks individually). Each participant was given the 10 index cards with the titles and summaries and asked to divide the cards into two piles, one pile of five which represented topics with which they were most familiar, the second pile of five representing topics with which they were least familiar. The participants were then asked to rank each of the topics in the two piles separately from most familiar (5) to least familiar (1); the resulting two piles, when combined, provided one pile in which the topics were ranked 10 (most familiar) to 1 (least familiar). Each participant then checked the order of the single pile to ensure that the pile was ordered most familiar to least familiar. The rankings from cohort were then

combined and a median rank was calculated for each topic. Because the rankings were based on an ordinal scale, the median rank was used to select the three topics ranked most familiar and the three topics ranked least familiar (Spyridakis & Wenger, 1991). Six texts – three with median scores of 10, 8, and 7 to represent familiar texts and three with median scores of 4, 3, and 2 to represent unfamiliar texts – were used in the experiment. The non-experimental cohort did not take part in the experiment. The six passages selected for the experimental treatments and their median scores are included in Table 3.

Table 3.

*Familiarity of Topics Based on Median Scores*

	Median Score	Minimum Score	Maximum Score
<b>Familiar topics</b>			
Depression	10	8	10
Vietnam	8	3	10
League of Nations	7	2	10
<b>Unfamiliar topics</b>			
India	4	1	8
Austria	3	1	8
Islam	2	1	6

*Shallow and deep processing.* After reading each text, I identified what I believed to be an inference that should be made during the reading of the passage. The history teachers involved in the selection of the topics were again approached and asked to read

the passages and determine whether the inference I had suggested was one that they would expect history student to generate in order to fully understand the historical situation described in the text. For eight of the passages, the teachers agreed that the suggested inference should be made; discussion between the researcher and the teachers resulted in the modification of the other two inferences. I then identified, in consultation with the teachers, an existing sentence in each passage that confirmed the inference that should have been made and converted the identified sentence into a sentence that contradicted the inference. An example is given in Table 4.

Table 4.

*Modified Sentence – Original and Contradictory*

Original sentence	The Communist forces were convinced from the start of the <i>justice</i> of their cause and their morale was <i>high</i> .
Contradictory sentence	The Communist forces were convinced from the start of the <i>injustice</i> of their cause and their morale was <i>low</i> .

If an existing sentence did not give the gist, I wrote a sentence that contradicted an inference that should have been made. When agreement was reached on the content of each contradicting sentence, the researcher modified the texts by inserting within each passage the statement that contradicted the inference (see Appendix B for an example). The contradiction was then inserted into the six text files (three familiar; three unfamiliar) created for the computer.

### *Measuring instruments*

To collect sentence reading-time data, the present study used a subject-paced reading task (Graesser & Riha, 1984; Haberlandt, 1984; Mitchell, 1984) that employed a computer-generated *subject-paced visual presentation* (SPVP) in which the subjects controlled the pace of the reading by pressing the right arrow key to move sequentially through the passage being read. According to Haberlandt (1984), it is assumed that significant differences in reading times occurring in accordance with experimental manipulation indicate both that the reader pressed the computer key when the sentence being read was understood and the reader did not move through the passages indiscriminately. The SPVP methodology was employed by Graesser and Riha (1984) in their effort to determine word-, sentence-, and passage-level variables that affected the reading times of sentences. This present study extended the use of the SPVP method to determine if the reading times of contradictory sentences in expository text demonstrate the effects on processing of the subjects' goal orientations.

Sundberg (1995) designed a self-paced visual representation computer program capable of millisecond accuracy which uses the computer's programmable interval timer for time measurement. During the reading of consecutive sentences in a passage, the computer timer waits for the vertical retrace of the monitor to finish and starts timing as soon as a new sentence appears on the screen in response to the subject pressing the right arrow key. The timing is stopped as soon as there is an indication that the subject has again pressed the right arrow key (following the reading of the sentence) and the reading time in milliseconds is recorded in a spreadsheet application. According to Sundberg, however, there is some measurement error ( $\leq 36$  msec) associated with the depression of

any computer key. The error, however, would be randomly distributed across all subjects and all passages, and because sentence reading times were recorded (as opposed to, say, word reading times), the total amount of error associated with the depression of the right arrow key was assumed to be negligible.

The program is designed to use a series of “x”s (e.g., xxxxx) equal to the number of letters in each word to represent words in a passage (punctuation appears in its original form). To illustrate, the sentence (from Morton, 1988, p. 80)

*Europe had no money to buy Canadian goods.*

appeared as “x”s on the computer screen as follows:

Xxxxxx xxx xx xxxxx xx xxx xxxxxxxx xxxxx.

followed by the remainder of the passage presented in same fashion. During the experimental treatments, the time between two consecutive right arrow key presses was recorded; that is, the individual time in milliseconds for each sentence was recorded for each subject and stored in a separate spreadsheet computer file for each subject.

Six passages (three familiar topics and three unfamiliar topics) were entered as separate files into the computer. Because six passages were used, it was possible that subject variables (research experience) and passage-level variables (e.g., order in which texts were presented, difficulty of texts) would affect the dependent variable measure of processing times of the contradictory sentences (Graesser & Riha, 1984). Subjects could become “practiced or fatigued or experiment-wise” (Tabachnik & Fidell, 1996, p. 47) as they experienced more passages. To control for both experience and order effects, a modified Latin square design was used to vary the order in which the passages were read by the subjects (Graesser & Riha, 1984; Tabachnick & Fidell, 1996). I prepared four

different sets of computer files with the passages in different order in each set (see Table 5).

Table 5.

*Order of Topics in Each File Set*

Set	Order of topics					
1	Depression	India	Vietnam	Austria	League	Islam
2	India	League	Austria	Depression	Islam	Vietnam
3	Vietnam	Islam	Depression	League	India	Austria
4	Austria	Vietnam	Islam	India	Depression	League

To control for possible effects of text difficulty, the reading levels of the passages were calculated using the Flesch-Kincaid readability formula (Microsoft Word™). Though readability formulas have been criticized as “a scandalous oversimplification, more frequently a serious distortion” (Weaver & Kintsch, 1991, p. 242; see also Bruce, Rubin, & Starr, 1981), they continue to be “the only game in town” (Weaver & Kintsch, 1991, p. 242; see also Fry, 1989). The results are shown in Table 6.

*Answers to questions.* The *what* questions for each passage were based on the explicit text. That is, a correct response to the question required information that was explicitly stated in the text. The questions were carefully constructed to ensure that words used in the question did not prime the subjects’ responses. For example, the passage about Vietnam contained the following statements: “The Communist guerilla army, ... from the start set about winning the support of the peasants. In areas under its control, the peasants were given land and were well treated...”, etc. The *what* question

Table 6.

Reading Levels<sup>1</sup> – Familiar and Unfamiliar Texts

<u>Familiar Texts</u>		<u>Unfamiliar Texts</u>	
Topic	Reading level	Topic	Reading level
Depression	9.1	Austria	10.9
Vietnam	11.7	India	12.0
League of Nations	10.7	Islam	12.0
Mean	10.5	Mean	11.6
<i>SD</i>	1.72	<i>SD</i>	0.40

*Note 1:* Reading level calculated by the Flesch-Kincaid method [(0.39 x mean sentence length) + (11.8 x mean number of syllables per word) – 15.59]

for this passage was: *What did the Vietcong do to ensure the assistance of the farmers in South Vietnam?*

In the present study, the *how* and *why* questions were linked in terms of probing for an inference that should have been drawn. The answer could be based either on an inference drawn based on the passage or on the contradiction stated explicitly in the text. For example, the original Vietnam passage contained the following statement: “The Communist forces were convinced from the start of the justice of their cause and their morale was high.” The statement was made contradictory by changing “justice” to *injustice* and the word “high” to *low*. The *how* question was: *How did the Vietcong feel about the reasons for which they were fighting?* A response that reflected the original passage would indicate that deep processing had occurred; the subject had inferred, based on the passage, something about the *justice of the cause* or the *morale* of the Vietcong. A response that reflected the contradictory statement (e.g., “They didn’t believe in what

they were doing”) would indicate shallow processing had occurred; that is, though the contradictory statement was incorrect (based on the gist of the passage), the explicit text containing the contradiction had been recalled. The *why* question (e.g., *Why did they feel that way?*) further probed the subjects’ understanding of the situation described in the passage (see Appendix C for an example of the questions).

### *Procedure*

It was possible that, despite random assignment to groups, the subjects within groups in the study would vary in their reading ability, motivation and control of learning beliefs, domain knowledge, and familiarity with the topics. Because these variables have been associated with shallow and deep-processing of texts, it was necessary to control for the possible effects of these variables on text processing. Prior to undertaking the SPVP procedure, the subjects in the experimental treatments and control group completed pre-experimental tasks that assessed their reading ability, motivation and control of learning beliefs, and domain knowledge. To avoid the possibility that assessing topic familiarity prior to the experimental treatments would prime the subjects, topic familiarity was assessed following the experimental treatments.

*Reading ability.* To determine each subject’s reading ability, the subjects in this study completed the vocabulary test section of the *Nelson-Denny Reading Test* (Brown, Fishco, & Hanna, 1993). Because differences in vocabulary knowledge result from rather than cause differences in reading skill (Daneman, 1991), a measure of vocabulary knowledge is considered a good index of comprehension. The *Nelson-Denny Reading Test* comprises both a multiple-choice vocabulary test and a multiple-choice

comprehension test. The use of the vocabulary portion of the test served two purposes: first, it provided me with a valid measure of reading ability that was independent of the subjects' reading ability as measured by comprehension tests; and second, it provided for the subjects what I considered a less onerous method of assessing reading ability.

Because the experiment involved reading six texts and answering *what*, *how*, and *why* questions associated with the texts, I felt that reading another seven texts in the *Nelson-Denny Reading Test* and answering 40 questions in a restricted time frame might discourage the subjects from continuing with the experimental portion of the study.

The *Nelson-Denny Reading Test* provides documentation that converts for statistical purposes subjects' vocabulary raw scores into equal-interval *scale scores* ( $M = 200$ ,  $SD = 25$ ). The subjects' raw scores were converted into scale scores and entered into a spreadsheet file which was subsequently transferred into the SPSS file for statistical analysis.

*Motivation and control of learning beliefs.* This study used the *Motivated Strategies for Learning Questionnaire* (Pintrich, et al., 1991) to assess the subjects' goal orientations and their use of different learning strategies. For purposes of this study, the MSLQ was shortened (McWhaw & Abrami, 1997) to assess only those motivational and cognitive variables that were germane to the study (see Appendix E).

Subjects in the experimental groups and the non-experimental cohort completed the abbreviated MSLQ by responding to each of the items on a scale of 1 (not at all like me) to 7 (very much like me). The mean scores for each of the subscales was calculated and entered into a spreadsheet file as a separate score that was considered an index of the

strength of the subject's attitude toward the subscale. The mean scores were then transferred to the SPSS file for statistical analysis.

*Domain knowledge.* To determine each subject's domain knowledge, participants in the experiment indicated prior to the experiment the last grade level of history course taken (Social Studies 11, History 12, or Other (see Appendix D). According to Royer, et al. (1996), domain knowledge accumulates over time as learners compile, organize, differentiate, and broaden their knowledge, and progress from novice to expert in a domain. It was assumed, for purposes of this study, that the last level of history course taken would provide a rough index of domain familiarity: the higher the level of course taken, the more domain knowledge possessed by the subjects. The responses were converted to an interval scale (Grade 11 = 1, Grade 12 = 2; first to fourth year university = 3 – 6). The converted responses were entered into a spreadsheet and then transferred into the SPSS file for statistical analysis.

#### *Experimental treatments*

All subjects were tested individually. Subjects in the four treatment groups and the control group completed four activities: a) pre-testing activities involving signing the informed consent form, the collecting of demographic information, indicating the level of the last history course completed, completing a vocabulary test, and completing the motivation and strategies survey; b) a puzzle-solving task (Graham & Golan, 1991); c) an experimental task in which subjects read excerpts from history texts using the SPVP procedure, and d) a question-answering task related to the passage content (Graesser, 1981; Graesser, et al., 1996; Graesser & Zwaan, 1995; Pearson, et al., 1979). Subjects

arriving for the experiment completed the pre-testing activities prior to entering the room for the experiment. All subjects completed the pre-testing activities without supervision and without any difficulties.

Following the completion of the pre-testing activities, the subjects entered the room in which the experimental portion of the activity took place. A computer was set up on a table and a comfortable and adjustable chair was placed in front of the computer. Subjects were encouraged to make themselves comfortable at the table in front of the computer. Each subject was first given an opportunity to practice using the computer. Three six-sentence paragraphs – not related to history topics and not containing a contradictory sentence – were included in the practice file. The procedure for using the computer was explained and each subject practiced using the computer. When the subject was ready, the space bar on the computer keyboard was pressed and the first passage, in the forms of “x”s, appeared on the screen (in the experimental conditions, computer parameters restricted the length of each passage to the number of sentences that would fill one screen). The right arrow key ( → ) was pressed and the first sentence of the passage in print form replaced the “x”s; the remainder of the sentences in the passage remained in their “x”s form. After reading the sentence, the subject pressed the right arrow key – the sentence just completed returned to its “x”s form and the next sentence appeared in print form. The procedure continued until the subject had finished reading the passage. The last sentence in each of the passages was *Please press the right arrow key*. On completing the passage, the subject pressed the right arrow key to stop the timing and clear the screen. The screen returned to blank, and the message “Press space bar for the next paragraph” appeared on the bottom of the screen. The process was

repeated for each of the three practice paragraphs. After completing the three practice paragraphs, each subject was asked if he/she was comfortable with the procedure. All subjects indicated they were. Following the completion of the practice activity, the experiment proceeded.

*Puzzle-solving task.* Subjects in all the experimental conditions and the control condition first completed a puzzle-solving task (Graham & Golan, 1991), which they were told was related to their performance on the experimental task. For this study, I used a commercially available puzzle task (*Tangoes*<sup>TM</sup>, Rex Games Inc., San Francisco, CA) based, according to the manufacturer, on a “4000-year-old Chinese tangram puzzle” that “helps develop problem-solving ... skills”. The puzzle consists of a set of 5 quadrilateral- and triangle-shaped plastic pieces that, when arranged, match any one of several silhouette shapes provided with the puzzle. Recall that Jagacinski and Nichols (1984; 1987) argued that a performance goal orientation can emerge either when success is achieved with little effort or when negative feelings develop following failure. The puzzle-solving task was selected based on its degree of challenge and its potential for failure in the time allocated for solution (1 min). The anticipated effect of the subjects’ completing the puzzle was to establish in all subjects either a feeling of success achieved with little effort or a feeling failure and a judgement that they lacked ability compared to others. This effect, however, would only influence those subjects receiving feedback that oriented them towards a performance goal; according to Ames (1992), the puzzle-solving task would have no effect on subjects who received feedback that oriented them towards a mastery goal.

The puzzle pieces were mixed up on the table in front of the subject. The subject was shown a silhouette shape and told he/she had 1 minute to arrange the all the puzzle pieces into a shape that matched the silhouette. I timed the effort, and at the end of the minute, told the subject to stop. I then showed the subject how the pieces could be quickly arranged in the shape of the silhouette (I had practiced arranging the puzzle-pieces into the selected puzzle shapes). The puzzle pieces were mixed up and another silhouette was shown to the subject, and the process repeated. Three of the 118 subjects attempting the puzzle-solving task were able to complete the task; however, each of these subjects wanted to know if they had completed the task more quickly than the others, thus focusing their efforts on doing better than others – a motivational pattern associated with performance goals (Ames, 1992). It appeared that the puzzle-solving task, whether solved or not, had the potential of creating in the subjects – even when success was achieved with little effort – the belief that they possibly lacked ability compared to others. After completing the puzzle-solving task, subjects in the control condition received procedural information only, read the excerpts from the texts (Graham & Golan, 1991) and answered the questions.

*Experimental tasks.* Subjects were randomly assigned either to one of four treatment groups designed to manipulate both processing task (shallow; deep) and motivational state (mastery goal; performance goal) or to a no-feedback control condition (Graham & Golan, 1991).

The manipulation of processing task was accomplished through an adaptation of the experimental tasks in Walker and Meyer's (1980) study in which subjects received instructions to induce processing at either surface or deep levels. In their experiment,

Walker and Meyer were able to demonstrate that different instructional demands induced processing at either surface or deep levels. In the present study, subjects were induced to process the text either at a surface level of understanding by instructing them: “As you read the passages, try to remember the information in the text” or at a deep level of understanding by instructing them: “As you read the passages, try to remember the events and how they are related to each other.”

Subjects in the two mastery goal conditions (mastery goal orientation plus either surface or deep processing) were induced to assume a mastery goal orientation following their completion of the puzzle-solving task by focusing their attention, through feedback from me, on concepts of mastery, effort, and the intrinsic value of the task (Graham & Golan, 1991). Following their completion of the puzzle-solving task, subjects in the mastery-goal conditions received the following feedback (processing tasks are in parentheses):

Many people make mistakes on these puzzles in the beginning but get better as they go along. When people see the puzzles as a challenge, it makes them try harder and have more fun along the way. The reading activity is a lot like that. If you concentrate on the task, try to see it as a challenge and enjoy mastering it, you will get better as you go along.

*(Deep level:* As you read the passages, try to remember the events and how they are related to each other; *Surface level:* As you read the passages, try to remember the information in the text.)

Conversely, a performance goal orientation is characterized as a motivational state in which students’ attention is focused on their “ability and sense of self-worth ...

evidenced by doing better than others (Ames, 1992, p. 262). Subjects in this study were induced to assume a performance goal orientation following their completion of the puzzle-solving task by focusing their attention, through feedback from me, on their “self-perceived ability and their ability relative to others” (Graham & Golan, 1991, p. 189). Following their completion of the puzzle-solving task, subjects in the performance goal conditions received the following feedback (processing tasks are in parentheses):

From how you did on the puzzles, I have a pretty good idea of how good you are at this type of problem-solving compared to other people your age. The reading activity is a lot like that in that people are either good at it compared to other people their age or they are not. So how you did on the puzzle activity tells me something about how you will do on the reading activity compared to other people your age. (*Deep level*: As you read the passages, try to remember the events and how they are related to each other; *surface level*: As you read the passages, try to remember the information in the text.)

In the control condition, subjects completed the puzzle-solving task and were given no feedback but were given procedural information on the experimental task. The inclusion of a no-feedback control group provided baseline performance in the absence of motivational manipulation or processing task. In the experimental treatments, subjects were given feedback and procedural information on the experimental task. All subjects read the three familiar and the three unfamiliar texts. Following the completion of each passage, each subject answered three questions about the passage (1 *what* question, 1 *why*

question, and 1 *how* question) (see Appendix C). Prior to answering the questions, the subjects were encouraged to answer the question as fully as they could.

Following the questions, and when the subject indicated he or she was ready to continue, the subject pressed the space bar and the next passage, in the “x”s format, appeared on the screen. The process was repeated until all six passages had been completed.

After completing the experimental treatments to which they were assigned, each subject ranked the familiarity of the passages from 1 (not at all familiar to me) to 5 (very familiar to me) (see Appendix F). This task permitted me to maintain an empirical link between the sample group that assessed topic familiarity prior to the experiment and the representative members of the subject population (Spyridakis & Wenger, 1991). The ranking was then entered first into a spreadsheet file and subsequently into the SPSS file for statistical analysis.

Following this, I answered any questions the subjects had relating to the experiment.

The total time allocated for each subject was 1 hour. In general, the amount of time allocated was sufficient for all activities to be completed.

### *Analysis of data*

An understanding of the implicit causal relationship requires deep processing. Deep processing is measured either by a) significant differences in the reading times of the contradictory sentence either between the experimental treatments or between an experimental treatment and the control condition or by b) an answer to a question that

infers information not explicitly stated in the passage. Memory for the explicit text requires shallow processing. This is reflected in the failure to process the text deeply (Just & Carpenter, 1987) and is measured either by a) no significant difference in the reading times of the contradictory sentence either between the experimental treatments or between an experimental treatment and the control condition or in b) an answer to a question that indicates memory for explicitly-stated information in the text.

*Reading times of contradictory sentences.* The spreadsheet files, comprised of the reading time data from the computer files, were first transferred to a separate spreadsheet application and then converted to an SPSS file for statistical analysis. The means and standard deviations for the reading times of the contradictory sentences were determined.

*Answers to questions.* Following the collection of the data, the cued recalls from all questions and from each subject in the experimental conditions and the control group were transcribed from the recording tapes and analyzed into thought-units (Spandel & Stiggins, 1981). Because a consistent unit was needed for the initial analysis, the thought-unit was selected. According to Spandel and Stiggins, a thought-unit “may be thought of as an independent clause plus whatever subordinate clauses or phrases accompany it” (p. 31). Because of the nature of question-answer responses (i.e., they often do not follow grammatical rules), the classification of thought-units in the present study followed logic rather than prescription. For example, the response *gave them land* made to the question “What did the Vietcong do to ensure the assistance of the farmers in South Vietnam?” would be classified as a thought-unit based on conversational rules that allow the subject from the question (Vietcong) to be implied by the person listening (Littlejohn, 1992).

The thought-units were then categorized as (a) textually-correct thought-units (b) situationally-correct thought-units and (c) errors. Given the number of situationally-correct thought-units possible, it was necessary to determine which would be accepted as correct or valid and which would be classified as errors. The difficulty in protocol analysis is demonstrated in the following example: In response to the question *How did the Communist forces feel about the cause for which they were fighting?*, one subject responded “They knew about it but their morale was low.” This response could be analyzed as either a *textually-correct thought-unit* because it was explicitly stated in the contradictory sentence (The Communist forces were convinced from the start of the injustice of their cause and their morale was low) or as an error (i.e., *situationally-incorrect thought-unit*) in that it failed to reflect the gist of the passage preceding the contradictory sentence. The subject’s subsequent response to the question *Why did they feel that way?* was “[They were] unsure of the cause they were fighting for.” This could be considered either as a *situationally-correct thought-unit* based upon the subject’s recall of the explicit text in the contradiction or as an error (i.e., *situationally-incorrect thought-unit*) based upon the passage preceding the contradictory sentence.

Although some theorists (e.g., Fries, 1963) argue that the meaning of a text is located in the text, others (e.g., Fish, 1980; Iser, 1980) argue that the meaning is more subjective. It was beyond the scope of this study to engage in a philosophical exposition about the exact location of the meaning of a text. Instead, a more pragmatic approach was necessary. In the classroom, it is the responsibility of both students and teachers to ensure that interpretations of text are based on events to which the text actually refers, and can be “reasonably supportable with references to events ... that occur [in the text]”

(Ruddell & Unrau, 2004, p. 1499). Responses (both explicit recall and inferences) from the subjects were therefore evaluated against the subject's previous answers to questions and then compared to the explicit text or to my belief about what the explicit text reasonably supported. In the example above, the response "They knew about it but their morale was low" was therefore classified as a textually-correct thought-unit (shallow processing). The response "[They were] unsure of the cause they were fighting for" was classified as a situationally-correct thought unit (deep processing) because of the subject's initial response.

With this constraint upon interpretations in place, a scheme for thought-unit analysis was adapted from the classification system used by Moravcsik and Kintsch (1993). Answers comprising *textually-correct thought-units* reflected the author's intent, either by using the exact wording or by paraphrasing the wording in the texts. *Situationally-correct thought-units* comprised both *extra-textual* inferences derived from knowledge (also called *far inferences* [Royer, et al, 1996]) and *text-connecting* inferences (also called *near inferences* [Royer, et al., 1996] or *backward inferences* [Just & Carpenter, 1987]) that causally links explicit information in the text (Graesser & Zwaan, 1995) and are made "whenever the subject's reading goals require a complete integration of the text information but the text does not explicitly indicate how the new information is related to the old" (Just & Carpenter, 1987, p. 252).

*Errors* contradicted the explicit information in the text or incorrectly linked explicit information in the text. Because each individual's knowledge base could not be determined, it was not possible to determine the basis for an incorrect inference derived from knowledge. Errors were counted, but they were not analyzed. It is assumed that

any errors in classification would be randomly spread across the protocol analyses and would not affect the subsequent statistical analysis. Examples of the thought-unit analysis are included in Table 7.

The aggregate number of textually-correct thought units and situationally-correct thought-units for the three familiar and three unfamiliar passages were entered into the SPSS file and the means and standard deviations for both familiar and unfamiliar passages were determined.

Table 7.

*Thought-unit Analysis – Original Text, Questions, Verbatim Answer, and Analysis*

Original Text	Question	Verbatim Answer	Thought-unit analysis
Canada's prosperity in the 1920s had two great flaws. First, it was narrowly based; most Canadians could not afford ...	Before the depression, what conditions existed that indicated the Canadian economy was in trouble?	It was narrowly based.	Textually-correct (exact wording)
India could not produce enough food for her own people; costly imports of food put pressure on the country's balance of payments ...	How did Indian society respond to these concerns? [Subject had indicated <i>food</i> as India's main concern following independence.]	They imported food from other countries.	Textually-correct (paraphrase)
The Communist forces were convinced from the start of the injustice of their cause and their morale was low. [Contradictory sentence inserted in the text]	How did the Communist forces feel about the cause for which they were fighting?	They didn't feel very good about it.	Textually-correct (paraphrase of the explicit text)
Even so, the people resisted government attempts to persuade them to have fewer children .... So the new programs of education in birth control, backed by free provision of contraceptives and with rewards for men who agreed to be sterilized ...	How did Indian society respond to these concerns? [Subject had indicated <i>population</i> as India's main concern following independence.]	They tried to get people to have fewer children by giving them rewards if they got sterilized and helping them to understand birth control	Text-connecting inference
The Communist forces were convinced from the start of the injustice of their cause and their morale was low. [Contradictory sentence inserted in the text]	How did the Communist forces feel about the cause for which they were fighting?	They felt they were in the right.	Text-connecting inference

Table7 (continued).

*Thought-unit Analysis – Original Text, Questions, Verbatim Answer, and Analysis*

Original Text	Question	Verbatim Answer	Thought-unit analysis
From the very start, the absence of the United States was a crippling blow to the League of Nations.	What role did the major world powers play in the League of Nations?	The USA refused to join as they didn't want to get involved in European affairs.	Extra-textual inference
... the absence of the United States was a crippling blow to the League of Nations .... Britain and France ... bypassed the league altogether .... Other great powers also played little part ...	What role did the major world powers play in the League of Nations?	They supported it and kept it strong.	Error (Incorrect text-connecting inference)
... the wheat pool tried to sell their 1928 crop. Two years earlier wheat had sold for \$2 per bushel .... It eventually sold for just over \$1 per bushel ...	Before the depression, what conditions existed that indicated the Canadian economy was in trouble?	The wheat stocks went up.	Error

## CHAPTER 4

### *Results of the study*

This section is organized into two subsections. In the first section, the pretest measures of variables known to influence text understanding were analyzed to control for the possible effects of these variables on the dependent measures of text-based learning. In the second section, the dependent variables were assessed as a function of experimental treatment and text type.

#### *Pre-test measures*

To determine if the pre-test measures could be interpreted as predictors (covariates) of the post-test DVs, the correlations between the pre-test measures were first calculated using Pearson  $r$ . The results of the analysis are shown in Table 8. The low to moderate correlations indicated that different linear combinations of the pre-test measures could not be interpreted as predictors (covariates) of the dependent variables. It was possible, however, that the individual pre-test measures could have independent effects on the DVs.

To test this possibility, a series of one-factor (group) analyses of variance (ANOVAs) were performed to assess the equivalency of the experimental and control groups on the pre-test measures of reading ability, goal orientation (intrinsic and extrinsic), control of learning beliefs, and domain knowledge. For these and subsequent analyses, significant ANOVAs were followed by post hoc comparisons between means with Fisher's least significant difference (LSD) test (Kirk, 1968). The means ( $M$ ) and standard deviations ( $SD$ ) for reading ability, goal orientation, learning beliefs, and

domain knowledge are displayed in the Table 9.

A one-factor (group) ANOVA was performed on all pre-test measures to determine if the non-experimental cohort ( $n = 15$ ) was representative of the subject population ( $N = 118$ ). A Pearson product-moment correlation ( $r$ ) was conducted between the median rank familiarity scores of the non-experimental cohort and the mean rating familiarity scores of the experimental and control groups (see Figure 1) to determine if the topic familiarity median rankings of the non-experimental cohort predicted accurately the topic familiarity ratings of the subject population.

*Reading ability.* A one-factor analysis of variance (ANOVA) was conducted to assess the equivalency of the experimental and control groups on the pre-test measure for reading ability as measured by the vocabulary scale scores from the *Nelson-Denny reading test* (1993). The analyses indicated that there were significant differences in the reading ability between groups,  $F(4, 113) = 2.967, p = .022$  (see Table 10). It is possible that these differences in reading ability could account for differences between the groups in their processing of text. Subsequent post hoc analysis revealed that mean of the vocabulary scale score for the control group ( $M = 236.0, SD = 14.1$ ) was significantly greater than the mean of the vocabulary scale scores for both the Shallow Processing + Master Goal Orientation group ( $M = 226.0, SD = 17.2$ ) and the Deep Processing + Performance Goal Orientation group ( $M = 221.4, SD = 23.1$ ). The mean of Deep Processing + Mastery Goal Orientation group ( $M = 234.4, SD = 13.8$ ) was also significantly greater than the mean of the DP + PGO group (all  $ps < .05$ ).

Table 8.

*Correlations between Pre-test Measures, Dependent Variables, and Pretest Measures and Dependent Variables*

	1	2	3	4	5	6	7	8	9	10	11
1. Internal goal orientation	--	.29**	.48**	.26**	.12	.16	.23*	.27**	.07	.07	.03
2. External goal orientation		--	.22**	-.02	-.01	.04	.09	.04	-.02	-.04	-.03
3. Control of learning beliefs			--	.16	-.06	.07	.25**	.12	-.08	-.04	-.05
4. Verbal scale score				--	.19	.18	.10	.28**	.23**	-.04	-.15
5. Domain knowledge					--	.21	.12	.25**	.32**	.07	-.12
6. Textually-correct TUs (familiar text)						--	.16	.37**	.38**	.06	.10
7. Textually-correct TUs (unfamiliar text)							--	.38	.08	.03	.04

Table 8 (continued).

	1	2	3	4	5	6	7	8	9	10	11
8. Situationally-correct TUs (familiar text)								--	.55**	.06	.08
9. Situationally-correct TUs (unfamiliar text)									--	-.04	-.09
10. Reading times of contradictions (familiar text)										--	.56**
11. Reading times of contradictions (unfamiliar text)											--

\* Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is significant at the 0.01 level (2-tailed)

Table 9

*Means and Standard Deviations for Reading Ability, Goal Orientation, Learning Beliefs, and Domain Knowledge as a Function of Group*

Pre-test measure	Experimental Group <sup>1</sup>									
	SP + MGO (n = 24)		DP + MGO (n = 24)		Control (n = 24)		SP + PGO (n = 23)		DP + PGO (n = 23)	
	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>
Reading Ability <sup>2</sup>	226.0 <sub>a</sub>	(17.2)	234.4 <sub>b</sub>	(13.8)	236.0 <sub>ac</sub>	(14.1)	227.5	(15.3)	221.4 <sub>bc</sub>	(23.1)
Intrinsic Goal Orientation	5.28	(0.78)	5.11	(0.88)	4.95	(0.98)	5.19	(1.02)	5.11	(1.02)
Extrinsic Goal Orientation	4.60	(1.26)	4.93	(0.88)	4.22	(1.17)	4.65	(1.33)	5.02	(1.16)
Control of Learning Beliefs	5.80	(0.70)	5.51	(0.97)	5.20	(1.35)	5.50	(0.88)	5.77	(0.88)
Domain knowledge	1.75	(0.90)	2.20	(1.14)	2.25	(1.59)	1.83	(1.03)	2.04	(1.40)

*Note 1:* SP = Shallow Processing Task; DP = Deep Processing Task; MGO = Mastery Goal Orientation; PGO = Performance Goal Orientation

*Note 2:* Within rows, means with the same subscripts are significantly different at  $p < .05$

Table 10.

*Analysis of Variance – Reading Ability*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3444.629	4	861.157	2.976	.022
Within Groups	32693.312	113	289.321		
Total	36137.941	117			

*Intrinsic Goal orientation.* Intrinsic goal orientation “concerns the degree to which the student perceives [him/]herself to be participating in a task for reasons such as challenge, curiosity, mastery” (Pintrich, et al., 1991, p. 9). A one-factor analysis of variance (ANOVA) was conducted to assess the equivalency of the experimental and control groups on the pre-test measure for intrinsic goal orientation. The analyses indicated that there were no significant differences between groups,  $F(4, 113) = .403$ ,  $p = .806$  (see Table 11).

Table 11.

*Analysis of Variance – Intrinsic Goal Orientation*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.422	4	.355	.403	.806
Within Groups	99.670	113	.882		
Total	101.092	117			

*Extrinsic Goal Orientation.* Extrinsic goal orientation “concerns the degree to which the student perceives [him/]herself to be participating for reasons .... not directly related to ... the task itself” (Pintrich, et a., 1991, p. 10). A one-factor analysis of

variance (ANOVA) was conducted to assess the equivalency of the experimental and control groups on the pre-test measure for extrinsic goal orientation. The analyses indicated that there were no significant differences between groups,  $F(4, 113) = 1.673$ ,  $p = .161$  (see Table 12).

Table 12.

*Analysis of Variance – Extrinsic Goal Orientation*

	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Between Groups	9.413	4	2.353	1.673	.161
Within Groups	158.920	113	1.406		
Total	168.333	117			

*Control of learning beliefs.* Students hold ideas about ability and effort that influence the purposes they set for learning (Woolfolk, 1993). Readers' effort after meaning (Bartlett, 1932) leads them to adopt particular goals to address their purposes (Graesser & Zwaan, 1995). Control of learning refers "to students' beliefs that their efforts to learn will result in positive outcomes" (Pintrich, et al., 1991, p. 12). It is possible that different readers will adopt different goals depending on their purpose for learning. A one-factor analysis of variance (ANOVA) was conducted to assess the equivalency of the experimental and control groups on the pre-test measure for control of learning beliefs. The analyses indicated that there were no significant differences between groups in control of learning beliefs,  $F(4, 113) = 1.481$ ,  $p = .213$  (see Table 13).

Table 13.

*Analysis of Variance – Control of Learning Beliefs*

	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Between Groups	5.723	4	1.431	1.481	.213
Within Groups	109.169	113	.966		
Total	114.892	117			

*Domain knowledge.* A one-factor analysis of variance (ANOVA) was conducted to assess the equivalency of the experimental and control groups on the pre-test measure for domain knowledge. The analyses indicated that there were no significant differences between groups in domain knowledge as measured by last history course completed,  $F(4, 113) = .774, p = .544$  (see Table 14).

Table 14.

*Analysis of Variance – Domain Knowledge*

	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Between Groups	4.747	4	1.187	.774	.544
Within Groups	173.219	113	1.533		
Total	177.966	117			

*Dependent Variables*

To determine if the dependent variables varied as a function of treatment either independently or in combination, the correlations between the DVs were first calculated

using Pearson  $r$ . (The results of the analysis are shown in Table 8.) The low to moderate correlations indicated that different linear combinations of the DVs would not vary as a function of treatment. It was possible, however, that the treatments could have independent effects on the DVs. To test for this possibility, separate 5 (group)  $\times$  2 (text type) analyses of variance (ANOVAs) were conducted.

### *Deep processing*

According to Haberlandt (1984), text understanding “may depend critically on the task given to the reader and since it may interact with the task, it is necessary to evaluate reading time levels ... relative to the type of task” (p. 220). The reading times of contradictory sentences and the number of situationally-correct thought-units inferred during cued recall were analyzed in separate 5 (group)  $\times$  2 (text type) analyses of variance (ANOVAs). The mean ( $M$ ) and standard deviation ( $SD$ ) for reading times for both familiar and unfamiliar text are displayed in the top half of Table 15 and the situationally-correct thought-units inferred for both familiar and unfamiliar text are shown in the bottom half.

*Reading times of contradictory sentences.* On the measure of reading times of contradictory sentences in both familiar and unfamiliar text, the manipulation of motivational state (mastery goal orientation, performance goal orientation) and processing task (deep) between the treatment groups did not result in differences in deep processing either between the treatment groups or between the treatment groups and the control group. The reading times of sentences containing a contradiction to an inference that should have been drawn were subjected to one-factor ANOVA with both familiar

Table 15.

*Means and Standard Deviations of Reading Times of Contradictory Sentences and Situationally-correct Thought-Units as a Function of Text Type and Experimental Condition*

Text type	Experimental Condition <sup>1</sup>									
	SP + MGO (n = 24)		DP + MGO (n = 24)		Control (n = 24)		SP + PGO (n = 23)		DP + PGO (n = 23)	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)
	Reading Times of Contradictory Sentences (in seconds)									
Familiar	6.20	(2.17)	6.56	(1.85)	6.24	(2.31)	5.96	(1.93)	6.64	(2.16)
Unfamiliar	5.13	(1.99)	5.59	(1.16)	5.50	(2.05)	5.16	(0.96)	5.56	(2.20)
	Situationally-Correct Thought-units Inferred <sup>2</sup>									
Familiar	1.63	(1.32)	1.92	(1.20)	1.56	(1.21)	1.30	(0.94)	1.34	(1.23)
Unfamiliar	1.59	(0.82)	1.67	(0.70)	1.88 <sub>a</sub>	(1.04)	1.48	(0.70)	1.24 <sub>a</sub>	(0.65)

*Note 1:* SP = Shallow Processing Task; DP = Deep Processing Task; MGO = Mastery Goal Orientation; PGO = Performance Goal Orientation

*Note 2:* Within rows, means with the same subscript are significantly different at  $p < .05$

and unfamiliar passages. The analyses indicated that there were no significant differences in the reading times either in familiar text,  $F(4, 113) = .407, p > .8$  or in unfamiliar text,  $F(4, 113) = .381, p > .8$  (see Table 16).

Table 16.

*Analysis of Variance – Reading Times of Contradictory Sentences in Familiar and Unfamiliar text*

Source		Sum of Squares	df	Mean Square	F	Sig.
Familiar text	Between Groups	7.152	4	1.788	.407	.803
	Within Groups	496.804	113	4.396		
	Total	503.956	117			
Unfamiliar text	Between Groups	4.690	4	1.173	.381	.822
	Within Groups	347.413	113	3.074		
	Total	352.104	117			

*Situationally-correct thought-units.* On the measure of situationally-correct thought units in both familiar and unfamiliar text, the manipulation of motivational state (mastery goal orientation, performance goal orientation) and processing task (deep) between the treatment groups did not result in differences in deep processing either between the treatment groups or between the treatments groups and the control group. The number of situationally-correct thought-units was subjected to a one-factor ANOVA in both familiar and unfamiliar passages. The analysis indicated that there were no significant differences between the

experimental groups in the number of situationally-correct thought-units either in familiar text,  $F(4, 113) = 1.014, p > .4$  or in unfamiliar text,  $F(4, 113) = 1.268, p = .1$  (see Table 17).

Table 17.

*Analysis of Variance – Situationally-correct Thought Units in Familiar and Unfamiliar texts*

Source		Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Familiar text	Between Groups	5.749	4	1.437	1.014	.403
	Within Groups	160.176	113	1.417		
	Total	165.925	117			
Unfamiliar text	Between Groups	5.072	4	1.268	1.997	.100
	Within Groups	71.741	113	.635		
	Total	76.814	117			

*Shallow processing*

The number of textually-correct thought-units recalled during cued recall was analyzed in a 5 (group) x 2 (text type) analyses of variance (ANOVAs). The mean (*M*) and standard deviation (*SD*) for textually-correct thought-units recalled for both familiar and unfamiliar text are displayed in Table 18.

*Textually-correct thought-units recalled.* The manipulation of motivational state (mastery goal orientation, performance goal orientation) and processing task (shallow) between the treatment groups did not result in differences in shallow processing either between the treatment groups or between the treatment groups and the control group in

Table 18.

*Means and Standard Deviations of Textually-correct Thought Units Recalled as a Function of Text Type and Experimental Condition*

Text type	SP + MGO (n = 24)		DP + MGO (n = 24)		Control (n = 24)		SP + PGO (n = 23)		DP + PGO (n = 23)	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)
Familiar	1.18	(0.86)	1.39	(0.56)	1.24	(0.60)	1.23	(0.65)	1.25	(0.64)
Unfamiliar	1.69 <sub>a</sub>	(0.83)	1.67 <sub>b</sub>	(0.72)	1.26 <sub>ab</sub>	(0.47)	1.48	(0.73)	1.20 <sub>ab</sub>	(0.67)

Textually-correct Thought-units Recalled<sup>2</sup>

*Note 1:* SP = Shallow Processing Task; DP = Deep Processing Task; MGO = Mastery Goal Orientation; PGO = Performance Goal Orientation

*Note 2:* Within rows, means with the same subscripts are significantly different at  $p < .05$

familiar text but did result in differences in shallow processing in unfamiliar text. The number of textually-correct thought-units recalled was subjected to one-factor ANOVA with both familiar and unfamiliar passages. The analysis indicated that there were no significant differences in the number of textually-correct thought-units recalled in familiar text,  $F(4, 113) = .313, p = .869$ , but significant differences in the number of textually-correct thought-units recalled in unfamiliar text,  $F(4, 113) = 2.493, p = .047$  (see Table 19).

Table 19.

*Analysis of Variance – Textually-correct Thought Units Recalled as a Function of Text Type and Experimental Condition*

Text type		Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Familiar text	Between Groups	.583	4	.146	.313	.869
	Within Groups	52.588	113	.465		
	Total	53.172	117			
Unfamiliar text	Between Groups	4.794	4	1.198	2.493	.047
	Within Groups	54.325	113	.481		
	Total	59.119	117			

Analysis of the pre-test measures had indicated that there were significant differences between groups on reading ability as measured by vocabulary scale scores. It is possible that differences in reading ability could account for the differences between groups in textually-correct thought-units recalled. An analysis of covariance (ANCOVA) test of between-subject effects in which reading ability (as measured by vocabulary scale

score) was removed as a covariate revealed no significant effect for reading ability ( $p > .4$ ). Therefore, reading ability was dropped from further analysis.

Post hoc analysis (Fisher's LSD) of the mean differences indicated that mastery-goal-oriented subjects (i.e., SP + MGO; DP + MGO) had outperformed both the control group and the Shallow Processing + Performance goal -Oriented group in the number of textually-correct thought-units recalled. The results suggested there were interesting main effects that could be further analyzed.

*Test of main effects.* On the measure of textually-correct thought units recalled in unfamiliar text, the manipulation of motivational state (mastery goal orientation, performance goal orientation) and processing task (shallow, deep) resulted in a main effect for goal orientation but no effect for processing task and no interaction between the treatment groups. The results are shown in Table 20.

Table 20.

*Test of Main Effects – Goal Orientation, Processing Task, and Interaction in Unfamiliar Text*

	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Goal orientation	2.715	1	2.715	5.647	.019
Processing task	0.540	1	0.540	1.122	.292
Goal orientation x Processing task	0.360	1	0.360	.749	.389
Error	54.325	113			
Total	311.778	117			

An ANOVA test for main effects revealed a main effect for goal-oriented readers,  $F(1, 113) = 5.647, p = .019$ , no main effect for processing task,  $F(1, 113) = 1.122, p > .05$ , and no interaction,  $F(1, 113) = .360, p = .389$ . Post hoc analysis (Fisher's LSD) revealed that mastery-goal-oriented readers recalled more textually-correct thought-units in unfamiliar text ( $M = 1.68, SD = .77$ ) than did both the control group ( $M = 1.26, SD = .47$ ),  $t(113) = 2.40, p = .018$  and the performance-goal-oriented readers ( $M = 1.34, SD = .70$ ),  $t(113) = 2.38, p = .019$ . Despite the promising results, however, the effect size for goal orientation was small (Cohen, 1992),  $\eta^2 = .048$ .

### *Discussion*

#### *Deep processing*

The results of this study were unexpected. The results suggest that manipulation of motivational states and processing task does not influence readers to select deep processing strategies, either during (as measured by reading times of contradictory sentences) or following (as measured by the construction of situationally-correct thought-units) their reading of history texts. Readers in this study, when compared either to a control condition or to a motivational state that encouraged the use of shallow processing strategies, did not process text more deeply when they were induced to adopt a motivational state that encourages deep processing strategies. Results of the analysis of data for situationally-correct thought-units support the findings relating to reading times of contradictory sentences. In familiar text, the groups that approached the reading task from a mastery goal orientation (i.e., SP + MGO; DP + MGO) inferred more

situationally-correct thought-units than did both control group and the groups approaching the task with a performance goal orientation (i.e., SP + PGO; DP + PGO) but the results were not significant ( $p = .403$ ). In unfamiliar text, the groups that approached the reading task from a mastery goal orientation also inferred more situationally-correct thought-units than did the groups approaching the task with a performance goal orientation but the results were not significant ( $p = .1$ ). An interesting anomaly, however, was noted: in unfamiliar text, the control group inferred more situationally correct thought-units than did the treatment groups and the comparison between the control group and the Deep Processing + Performance Goal Orientation group was significant ( $p = .008$ ).

The finding that the control group inferred significantly more situationally-correct thought-units ( $M = 1.88$ ,  $SD = 1.04$ ) than did the DP + PGO group ( $M = 1.24$ ,  $SD = 0.65$ ) was investigated further. Of interest was whether this was a treatment difference (i.e., due to motivational and task manipulation) or a difference that could be explained from another perspective. It was possible that reading ability could account for the differences; however, an examination of the number and gender of subjects assigned to groups (see Table 2) also suggested that the control group, comprising 50% females and 50% males was different from the other groups (which showed a much higher percentage of females in each group). A test of between-subjects effects which removed reading ability as a covariate and used gender as a fixed factor indicated that the observed differences were not explained either by reading ability,  $F(1, 117) = 2.965$ ,  $p = .088$ , or by group,  $F(4, 113) = 0.406$ ,  $p = .804$ , but were explained by differences in gender  $F(1, 117) = 7.050$ ,  $p < .009$ . Because group differences in motivation were the topic of interest in this study,

further analysis and interpretation of these identified gender differences were not undertaken.

What alternative explanations exist for the null result? It is possible that the empirical method used to determine text familiarity in the present study failed to discriminate between familiar and unfamiliar texts; that is, the null result emerged because the texts used in the study were equal in familiarity. The data in this present study provide converging evidence that the classification of familiar and unfamiliar texts was empirically sound. Graesser and Riha (1984) argue that a more extensive knowledge base should make possible faster reading times in familiar text. The speed with which readers can interpret and synthesize information should lead to shorter reading times (Johnson & Kieras, 1982; Sanford & Garrod, 1980). It is also possible that readers apply less effort to reading familiar text because they believe they already know a great deal about the topic and therefore do not attempt to integrate new information into their existing knowledge base. In the present study, it would be expected that the total reading time of familiar passages would be less than the total reading time for unfamiliar passages. Analysis of the reading times for familiar and unfamiliar passages supported this hypothesis. The mean reading time in seconds for unfamiliar passages ( $M = 113.9$ ,  $SD = 31.79$ ) was significantly greater than the mean reading time in seconds for familiar passages ( $M = 109.8$ ,  $SD = 30.46$ ),  $t(117) = 4.10$ ,  $p < .0001$ . However, this significant difference could also emerge from other passage-level variables associated with reading times of texts.

Graesser and Riha (1984) argued that the order in which texts were presented to the subjects could affect the reading times of the sentences in the texts. A one-factor analysis of variance (ANOVA) was conducted to assess the order in which both familiar

and unfamiliar texts were read and the reading times of the passages. The analyses indicated that there were no significant differences in the reading times of passages due to order for either familiar texts,  $F(3, 117) = 1.665, p = .179$ , or unfamiliar texts,  $F(3, 117) = 1.250, p = .295$  (see Table 21).

Table 21.

*Analysis of Variance – Order in which Familiar and Unfamiliar Texts were Read and Reading Times of Passages*

Source		Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Familiar text	Between Groups	4555.79	3	1518.595	1.664	.179
	Within Groups	104006.84	114	912.341		
	Total	108562.62	117			
Unfamiliar text	Between Groups	3767.79	4	1255.931	1.250	.295
	Within Groups	114503.31	114	1004.415		
	Total	118271.10	117			

Graesser and Riha (1984) also argued that the difficulty of texts could affect the reading times of the sentences in the texts. The difficulty of both the familiar and the unfamiliar texts was assessed through the Flesch-Kincaid Readability Formula  $[(.39 \times \text{mean sentence length}) + (11.8 \times \text{mean number of syllables per word}) - 15.59]$ . A *t*-test indicated that the mean reading level of the familiar passages ( $M = 10.5, SD = 1.72$ ) and of the unfamiliar passages ( $M = 11.6, SD = 0.40$ ) were not significantly different,  $t(2) = 1.28, p = .16$ . However, according to Weaver and Kintsch (1991), if groups “are

reading with different strategies, then the formula may not be valid across the situations” (p. 242). Thus, it is not possible to rule out the possibility that the null result in the analysis was caused by the difficulty of the texts. It should be noted, however, that the mean reading levels of both the familiar texts ( $M = 10.5$ ) and unfamiliar texts ( $M = 11.6$ ) indicate that the texts likely would not have been perceived as difficult by the university-age subjects.

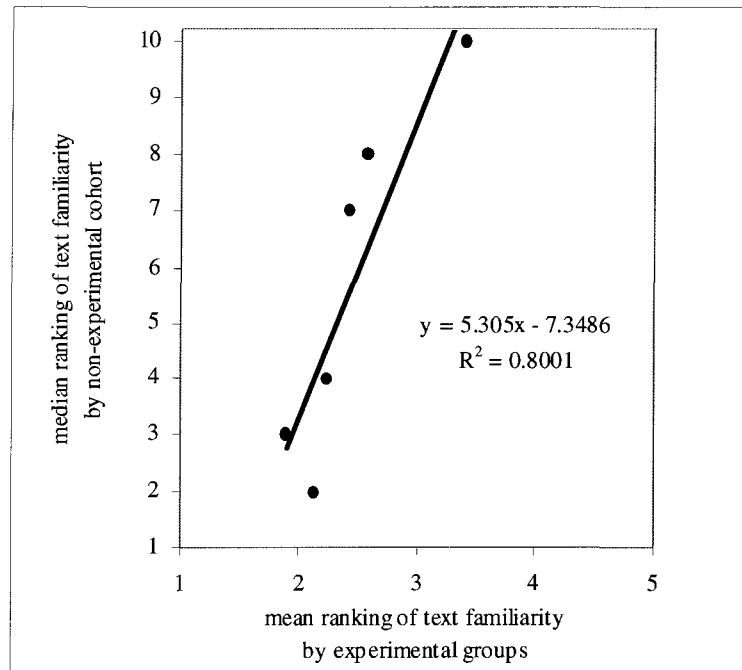
It was also possible, however, that the mean of the familiarity ratings of the subjects involved in the experimental treatments were significantly different from the median familiarity ratings of the non-experimental cohort. To test the possibility that the non-experimental cohort was not representative of the sample population involved in the experimental treatments, a one-factor ANOVA was conducted between the non-experimental cohort and the experimental groups on all pretest measures. There were no significant differences between the non-experimental cohort and the experimental groups on all pre-test measures (all  $ps < .05$ ). To test the possibility that the familiarity ratings between the non-experimental cohort and the experimental groups were different, the correlation between the median familiarity rankings of the non-experimental and the mean familiarity rankings of the experimental groups was calculated (Spyridikas & Wenger, 1991) using Pearson  $r$ .

The results of the comparison are shown in Figure 1. The results of the analysis indicated that the correlation between the familiarity rankings of the non-experimental cohort and the experimental subjects was .89,  $r_{crit}(4) = 0.729$ ,  $p \leq .05$ . The high correlation indicates that Spyridikas and Wenger’s (1991) method of determining text

familiarity was, for purposes of this study, empirically sound, and that differences in familiarity ratings did not lead to the null result.

Figure 1.

*Correlation between Median and Mean Rankings of Text Familiarity – Non-experimental Cohort and Experimental Groups*



The possibilities that a) the empirical method used to determine text familiarity in the present study failed to discriminate between familiar and unfamiliar texts, b) the order in which texts were presented to the subjects, c) factors associated with text difficulty and d) the mean familiarity ratings of the subjects were significantly different from the median familiarity ratings of the non-experimental cohort were all rejected as explanations for the null results associated with deep processing.

The results of the data analysis suggest that, either during or following the reading of familiar and unfamiliar topics, manipulation of either or both motivational state and

processing task does *not* influence readers' selection of deep processing strategies that lead to a deeper understanding of the events described in history texts. This finding contradicts recent theoretical arguments (e.g., Guthrie & Wigfield, 2000) that mastery-goal-oriented readers both apply more effort and select strategies (Nolen & Haladyna, 1990a) in their reading tasks that enable them to deeply process the texts they read. The finding also contradicts initial research into motivation and cognition (Graham & Golan, 1991) that concluded "individuals remember verbal material better when they are required to analyze it for meaning (deep processing) than when they focus only on its superficial characteristics (shallow processing)" (p. 190). Graham and Golan's research, however, employed word lists rather than text passages to test the effects of motivational manipulation on recall of verbal material. Kintsch (1994) has argued that memorizing a list of words is not the same as understanding a text. This present study demonstrated that the motivational effects on the selection of deep processing strategies noted in Graham and Golan's study do not transfer to situations in which individuals read either familiar or unfamiliar history passages.

### *Shallow processing*

According to Just and Carpenter (1987), "... a reader's failure to detect a factual inconsistency in a text can indicate incomplete processing at the [deep] level" (p. 219). Therefore, no difference in reading times between treatment conditions or between a control condition and a treatment condition that induced deep processing would suggest that the text had been processed at a shallow level. In the absence of deep processing, it might be argued that only shallow processing remains as an explanation. The interpretation that shorter

readings times indicate shallow processing had occurred requires accepting the null hypothesis, and so it cannot, by itself, be interpreted as statistical evidence that shallow processing had occurred. However, the results of the analysis of textually-correct thought-units in familiar text, taken in concert with reading times of contradictory sentences, do add support to the understanding that readers tend to be satisfied with shallow processing. There were no significant differences between the groups in number of textually-correct thought-units recalled following the reading of familiar text ( $p = .869$ ) (see Table 18). Students, by not selecting deep processing strategies, tend to remember the explicit text. The results appear to support research by Vonk and Noordman (1990) and others (see, e.g., Beck & McKeown, 1988; McKeown & Beck, 1994; McKoon & Ratcliffe, 1992) based on either a text-linguistic or schema theoretical approach that readers tend to be satisfied with shallow processing.

However, the manipulation of motivational state (mastery goal orientation, performance goal orientation) and processing task (shallow) led to significant differences in the number of textually-correct thought units recalled in unfamiliar text ( $p = .047$ ). The test of main effects (see Table 20) indicated a main effect for goal orientation ( $p = .019$ ), no main effect for processing task ( $p = .292$ ) and no interaction ( $p = .389$ ). Post hoc analysis following the test of main effects indicated that mastery-goal-oriented subjects had recalled significantly more textually-correct thought units than did both the control group ( $p = .019$ ) and the performance-goal-oriented subjects ( $p = .018$ ).

The significant results associated with explicit recall of unfamiliar text cannot be explained in terms of existing theory associated with either the text-linguistic or schema-theoretic perspectives of reading comprehension. Both the text-linguistic and schema-

theoretic perspectives have in common the belief that memory for the explicit text is represented cognitively as a *textbase* containing “explicit text propositions in a stripped-down form that preserves meaning, but not the exact wording and syntax of the text” (Graesser & Zwann, 1995, p. 117). It has always been assumed that the amount of explicit information recalled results from the passive and automatic encoding of linguistic elements in the text (Perfetti, 1988) and quantitative differences of remembering more or less text (Kintsch, 1994) did not require explanation. As this study has demonstrated, however, there are quantitative differences in the amount of unfamiliar text recalled as a function of different goal orientations. The results of this study suggest that it is not tenable to conceptualize shallow processing as unitary; instead, it is necessary to account for the quantitative differences in the amount of text recalled in terms motivation and goal orientation.

The results of this study can be explained in terms of a goal mediation model of cognitive engagement. Meece, et al.’s (1988) goal mediation model of cognitive engagement argues that differences in students’ self-perceptions of ability and competence and their perceptions of instructional demands influences their selection of either a mastery or a performance goal orientation (Meece, et al., 1988). Students use information embedded in learning tasks to make judgements about their ability and their willingness to use effortful strategies in learning tasks (Ames, 1992) and Meece, et al. argue that the interpretation of the situation can make individual differences in learning behaviours “less powerful and influential” (p. 516). It is possible that the subjects in the present study interpreted the task in relation to the perceived familiarity of the texts. Familiar topics, which the subjects believed they knew and therefore possessed the ability

to understand, were interpreted as requiring less effort. According to Jagacinski and Nicholls, (1984), a performance goal orientation can emerge when success can be achieved with little effort. Because the topics in the familiar texts were interpreted as familiar and therefore requiring little effort, the subjects adopted a performance goal orientation and selected processing strategies that resulted both in their using significantly less time reading familiar texts ( $M = 109.8$  secs,  $SD = 30.46$ ) than reading unfamiliar texts ( $M = 113.9$  secs,  $SD = 31.79$ ) and in their failure to develop a deep understanding of the historical events described in the text.

Unfamiliar texts, however – the topics about which the subjects believed they did not know and therefore lacked the ability to fully understand – were interpreted as requiring more effort (as evidenced by the subjects' using significantly more time to read unfamiliar texts). According to Jagacinski and Nicholls (1984), however, the judgement that one lacks ability is associated with a performance goal orientation. Self-perceptions of ability negatively influence cognition when students adopt a performance goal orientation (Ames, 1992). Effort-based strategies “are more likely to occur when students are focused on mastery goals” (p. 262) but the use of these strategies is contingent upon the belief that effort will lead to success (Garner, 1990). Though subjects realized that more effort was required (i.e., they took more time to read the texts) they also realized they lacked the knowledge necessary to infer knowledge-based inferences (Graesser & Zwaan, 1995); that is, they lacked the knowledge necessary to succeed. The subjects' judgements that they lacked ability and that the use of deep processing strategies would not lead to success led to them adopting a performance goal orientation that resulted in their selecting strategies that prevented their developing a deeper understanding of the unfamiliar text.

To what end did the effort-based strategies lead? Post hoc analysis following the test of main effects for recall of explicit thought units in unfamiliar text indicated that mastery-goal-oriented subjects performed significantly better than did performance-goal-oriented subjects. Though the subjects realized they lacked ability (i.e., knowledge), these self-perceptions of ability influenced cognition when the subjects were oriented towards performance goals but not when they were oriented toward mastery goals (Ames, 1992). Mastery-goal-oriented subjects worked harder and experienced more positive outcomes (Graham & Golan, 1991) while performance-goal-oriented subjects focused on achieving success with little effort (Ames, 1992). The mastery-goal-oriented subjects recalled more explicit information from the unfamiliar texts, but in the case of the performance-goal-oriented subjects, recalls were expressed in a way that demonstrated less knowledge of the gist attained with less effort.

#### *Summary*

The present study has demonstrated that the amount of explicit text recalled, when reading unfamiliar passages, may be influenced by the reader's motivational orientation. The results suggest that readers, upon identifying the text as either familiar or unfamiliar, read the unfamiliar text more slowly as a way of beginning the process of learning from text. This is the first study to report significant differences in the amount of explicit information recalled following the reading of texts based on a motivational intervention and brings into question theories based on the present understanding that the amount of explicit information recalled is determined through passive encoding of linguistic elements. Instead, readers appear to interpret the reading task on the basis of the perceived familiarity of the topics and, because readers believe they understand familiar

topics, they apply less effort to reading these passages. Manipulation of motivational state and processing task does not influence deep processing in either familiar topics or unfamiliar texts, but more effort is applied in the shallow processing of unfamiliar topics as mastery-goal-oriented readers begin the process of learning new information from text.

## CHAPTER 5

*Conclusions and recommendations**Summary of the study*

*Purpose.* The purpose of this study was to determine if, while reading familiar and unfamiliar topics in history texts, different motivational states influenced the subjects' goal orientations and lead to their using either shallow- or deep-processing strategies that subsequently influenced their text-based learning. Text-based learning was defined as what has been stored in memory or what has been remembered following the reading of any text and applies to the products of either *deep processing* or *shallow processing*. In this study, shallow and deep processing were measured both by a) the reading times of sentences that contradicted an inference the reader should have made and by b) answers to *what*, *how*, and *why* questions.

*The research questions.* The research questions were stated as follows (The two alternate questions not answered have not been included):

1. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), are there differences between the experimental groups in the recall of textually-correct thought units?
2. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task

(shallow v. deep), are there differences between the experimental groups in the recall of situationally-correct thought units?

3. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), are there differences between the experimental groups in the reading times of sentences that contradicted an inference that should have been drawn?
4. As a result of manipulating text type (familiar v. unfamiliar), motivational state (mastery goal orientation v. performance goal orientation) and processing task (shallow v. deep), is there a main effect due to motivational states, but no main effect for processing task and no interaction?

*Procedure.* The sample for this study comprised 133 university students, of whom 118 were randomly assigned to one of four treatment groups and a control group. Fifteen subjects were assigned to a non-experimental cohort that, prior to the start of the experiment, determined the topic familiarity of passages used in the experiment.

Deep processing and shallow processing were measured by two methods: a) the reading times in msec of sentences that contradicted an inference that the reader should have made, and b) answers to *what*, *how*, and *why* questions that elicited both explicitly-stated information and inferences about the events described in the history texts.

The reading passages were selected from secondary-level history texts. Topic familiarity was determined by the non-experimental cohort that ranked the passages on a scale of 1 (least familiar) – 10 (most familiar). The median scores were calculated and

the three highest-ranking and three lowest-ranking passages were used in the experiment. The passages were entered into separate computer files.

Prior to the experiment, the subjects completed the vocabulary portion of the *Nelson-Denny Reading Test* (1993) and selected response items from the *Motivated Strategies for Learning Questionnaire*. On completion of this activity, the subjects entered the room in which the experiment was conducted and were randomly assigned either to one of four treatment groups or to a no-feedback control condition.

During the experiment, the subjects in the experimental groups first completed a puzzle activity that created within the subjects the belief that they lacked ability compared to others. The subjects in the four treatment groups then received instructions that manipulated both motivational state (either mastery goal or performance goal) and processing task (either shallow or deep). The subjects then completed the sentence-reading task by reading each passage on the computer and answered three questions following the reading of each passage. The computer program presented the passages one sentence at a time to the subjects who pressed the right-arrow key to advance the text. The computer recorded the time between successive button-pushes with msec accuracy and recorded the reading times in msec of each of the sentences in each of the passages. The control group did not receive instructions, but completed the sentence-reading task and answered the questions. All subjects in the experimental groups read all six of the passages.

Following the experiment, the data from all measures (reading times of contradictory sentences, numbers of textually-correct and situationally-correct thought units) were initially subjected to an analysis of variance (ANOVA) and, where pre-test

measures indicated significant differences between groups, the measures were subjected to analysis of covariance (ANCOVA). Post-hoc analyses used Fisher's least significant difference (LSD). The comparisons between the non-experimental cohort's ranking of text familiarity and the subjects' subsequent ranking of text familiarity were calculated using Pearson's  $r$ . Differences between the readability scores of the passages used in the experiment were determined with  $t$ -tests.

*Limitations.* First, this study was limited to the population from which the sample was drawn and cannot be generalized to other populations in other settings. Second, the experts' philosophical beliefs about the deep processing required to understand the text may not reflect the subjects' empirical reality. Third, the validity of the study rests upon the reliability and validity of the measuring instruments used. Fourth, Hawthorne effects may have influenced subjects in the experiment in different ways. Fifth, this study used history texts as materials and the findings may not be generalizable to situations in which other types of expository discourse are used.

*Pre-test, topic familiarity, and text difficulty measures.* The findings that emerged from the analysis of the data are summarized as follows:

There were no significant differences between the experimental groups in the pre-test measures of Intrinsic Goal Orientation ( $p = .806$ ), Extrinsic Goal Orientation ( $p = .161$ ), Control of Learning Beliefs ( $p = .213$ ), and Domain Knowledge ( $p = .544$ ). There was a significant difference between the experimental groups in the pre-test measure of Reading Ability ( $p = .022$ ). The non-experimental cohort's median topic familiarity rankings and the individual subjects' mean topic familiarity rankings of the passages used

in the experiment were correlated at .89 ( $p \leq .05$ ). The mean reading level of the familiar passages and of the unfamiliar passages were not significantly different ( $p = .16$ ).

*Deep processing.* The findings that emerged from the analysis are summarized as follows:

There were no significant differences between the experimental groups in the reading times of sentences containing a contradiction to an inference that should have been drawn in either familiar text ( $p = .803$ ) or in unfamiliar text ( $p = .822$ ). There were no significant differences between the experimental groups in the number of situationally-correct thought-units inferred in either familiar text ( $p = .403$ ) or in unfamiliar text ( $p = .1$ ).

*Shallow processing.* The findings that emerged from the analysis of data are summarized as follows:

There were no significant differences between the experimental groups in the number of textually-correct thought-units recalled in familiar text ( $p = .869$ ). However, there was a significant difference between the experimental groups in the number of textually-correct thought-units recalled in unfamiliar text ( $p = .047$ ). An ANCOVA test of between-subjects effects in which Reading Ability was removed as a covariate revealed no significant effect for reading ability ( $p = .4$ ). Post hoc analysis (Fisher's LSD) revealed that the mastery-goal-oriented subjects had outperformed both the control group and the Shallow Processing + Performance goal -Oriented group.

A subsequent test for main effects revealed a main effect for goal orientation ( $p = .019$ ), no main effect for processing task ( $p = .292$ ), and no interaction ( $p = .389$ ). Post hoc analysis (Fisher's LSD) indicated that the mastery-goal-oriented subjects

recalled more textually-correct thought-units than did both the control group ( $p = .018$ ) and the performance-goal-oriented readers ( $p = .019$ ).

### *Conclusions*

#### *Deep processing*

This study tested, in a direct and controlled manner, the effects of goal orientations on readers' use of both deep-processing strategies and shallow-processing strategies during and following text-based learning to determine if the relationships were causal.

The results were disappointing. Differences among groups in reading times of contradictory sentences and situationally-correct thought-units are assumed to reflect the deep processing of text (Graesser & Riha, 1984; Graesser & Zwaan, 1995). This study's non-significant findings should give pause to those theorists and researchers (e.g., Graesser & Zwaan, 1995) who argue that readers process text to the deepest levels possible (unless, of course, the *deepest levels possible* is assumed to be a subjective state) and contradicts arguments by Guthrie and Wigfield (2000) who state that readers adopting a mastery goal orientation will process text more deeply.

Present text-processing theory conceptualizes text processing as either deep or shallow (e.g., Graesser & Zwaan, 1995). This study demonstrated that different motivational patterns (at least, patterns conceptualized as mastery goal and performance goal) do not influence a reader's selection of deep processing strategies during the processing of either familiar or unfamiliar text. The constructionist theory of text comprehension which conceptualizes reading as a process that addresses readers' goals

(Graesser & Zwaan, 1995) and one in which readers routinely process text at the deepest levels possible (Graesser, Singer, & Trabasso, 1994) is not supported by the present study.

The results should not be interpreted as suggesting that students do not construct any inferences either as part of the ongoing processes following the reading of either familiar or unfamiliar text. Readers do draw inferences, but (from an anecdotal perspective) the quantity and quality seemed to vary in the present experiment in about the same way as they did during my years as a classroom teacher. In familiar text, the total number of situationally-correct thought-units ranged from 1 to 15, with a median of 4, while in unfamiliar text, the total number ranged from 0 to 14 with a median of 4.

#### *Shallow processing*

Previous studies have suggested that university-age readers tend to be satisfied with shallow processing (Vonk & Noordman, 1990). The non-significant results associated with the deep-processing conditions cannot be accepted as an indication of shallow processing as it means accepting the null hypothesis. Although it is tempting, it is not possible to draw conclusions about the role of goal orientations in shallow processing based on the reading times of the contradictory sentences. The results associated with recall of textually-correct thought-units, however, do suggest that goal orientation influences the amount of text recalled. The finding in the test of main effects that mastery-goal-oriented subjects recalled significantly more textually-correct thought-units in unfamiliar passages than did both the control group and the performance-goal-oriented subjects is an important finding both in the field of educational psychology and

for classroom teachers concerned with their students' learning from texts.

From a psychological perspective, the finding that significant differences exist between mastery-goal-oriented and performance-goal-oriented readers in the quantity of explicit information recalled following the reading of a text adds support to the growing body of knowledge that argues for the psychological validity of the separation of goal orientations into mastery and performance goals and that these goals differentially affect student learning (Lapadat, 2000; Meece, et al., 1988). This understanding can now be extended to situations in which students read unfamiliar topics in history texts. The finding also suggests that memory for the explicit text is not the result of the automatic execution of linguistic elements in the text. If this were the case, the results would not show significant differences between mastery-goal-oriented and performance-goal-oriented subjects in the recall of explicit information from the texts. Instead, the finding suggests that mastery-goal-oriented readers apply more effort than do performance-goal-oriented readers and this effort enables them to commit to memory more of the explicit information in the text. The present study demonstrates that there possibly exists a causal link between motivational variables and the shallow processing of unfamiliar text. However, the nature of the strategic processing in unfamiliar text is not clear; that is, the concept of shallow processing does not appear to be unitary. Because only the explicit text or its gist was recalled, the nature of the differences between mastery-goal shallow processing strategies and performance-goal shallow processing strategies was not ascertained from the protocols.

#### *Motivation and text-based learning*

This study has demonstrated significant differences in the shallow processing of

history texts between mastery-goal-oriented readers and performance-goal-oriented readers and between mastery-goal-oriented readers and a control group which received no motivational or task manipulation. The results may provide theorists with a starting point from which a comprehensive theory of text-based learning may be developed that includes a role for motivation. The belief that text-based learning is the product of the interaction between text and knowledge must be modified to explain how different goal orientations can lead to differences in the amount of information recalled following the reading of unfamiliar (history) topics.

#### *Educational Implications*

This study suggests that teachers cannot expect that establishing a classroom climate that encourages students to adopt a mastery goal orientation will necessarily lead to students selecting processing strategies that lead to a deep understanding of either familiar or unfamiliar text. When other factors associated with the deep processing of text are held constant, manipulation of motivational state and processing task does not lead to a deeper understanding of the passages being read. This, of course, may not be under the teacher's control. If the argument made in this study that students might interpret the reading tasks on the basis of text familiarity, then a teacher's attempt to establish conditions that are believed to encourage deep processing may be thwarted. Students who interpret a text as familiar may believe they already know all they need to know about a topic, and in the absence of a more specific goal (McKoon & Ratcliffe, 1992), may not apply the effort necessary to develop a more thorough understanding of the topic. Those who interpret a text as unfamiliar will not have the necessary knowledge

to deeply process the text (Graesser & Zwaan, 1995).

From a classroom perspective, it is perhaps enough to know, at the present time, that readers remember more of the explicit text when they approach a reading task with a mastery goal orientation, and that a performance goal orientation, found to lead to unfavorable results in performance (Graham & Golan, 1991) mediates a reader's attempts to achieve success with little effort (Ames, 1992). This is a significant finding for classroom teachers. Classrooms almost always comprise situations in which students must read about unfamiliar topics. Royer, et al. (1996) argue, "... the comprehension of the surface meaning of a text is a necessary prerequisite for formulating ... inferences" (p. 378). If, following the reading of a text, we want readers to construct inferences that link explicit information in the text, it will be necessary for readers to remember more of the explicit text. The results suggest that, when compared to either classrooms in which a performance goal orientation predominates (e.g., a focus on either the norm or competition amongst students) or classrooms in which a particular learning task is encouraged (remember the specific details in the text), classrooms in which a mastery goal orientation is encouraged might possibly lead to quantitative differences in the amount of explicit information remembered about unfamiliar topics in history texts. This suggests that an instructional focus that establishes a motivational climate that promotes a mastery goal orientation will be more beneficial to students than one that provides instructions (e.g., to remember the specific details in the text) that supposedly promotes memory for the explicit text (Walker & Meyer, 1980).

Students, because they may lack the necessary prior knowledge to formulate extra-textual inferences in unfamiliar text (Graesser & Zwaan, 1995), will be able to

make text-connecting inferences following their reading only if they have remembered the explicit information necessary for these inferences. This appears to be dependent upon teachers establishing conditions in their classrooms that encourage deep processing and the students' willingness to invest the necessary effort. Research by Turner (1995) demonstrated that teachers who encourage engagement (e.g., tasks that promote self-improvement, autonomy, personal interest, and collaboration) promote increased strategy use, persistence, and effort in literacy tasks. It is therefore important for teachers both to establish conditions in their classrooms that promote quality of involvement and make a commitment to promoting motivational patterns (Ames, 1992) that encourage memory for the explicit information in texts.

#### *Theoretical implications and recommendations for future research*

This study tested the role of goal orientations and processing task on readers' selection of shallow or deep processing strategies during their reading of history texts. Though several issues can be pursued, I will first consider the theoretical implications of the study; second, the limitations of the study and the methodology will be considered.

#### *Theoretical implications*

This study does not contribute to a theoretical understanding of the motivational processes that might contribute to the *deep processing* of either familiar or unfamiliar topics in expository text. That said, the results associated with deep processing in unfamiliar text were more interesting and may have theoretical implications. The analysis of variance of situationally-correct thought-units in unfamiliar text in the present study indicated no significant differences between groups ( $p = .1$ ). It can be argued that

the results demonstrate that individuals do not draw inferences in unfamiliar text following the reading of the texts. Although the possibility of a Type I error increases with increases in the alpha level, some researchers have argued that a more liberal alpha can be employed when an experiment is conceptualized as exploratory in nature (Graesser & Riha, 1984). When compared with the results of situationally-correct thought-units in familiar text ( $p > .4$ ), it appears that something more was occurring following the reading of unfamiliar text. Because alpha was set at .05 for all tests, the result was not explored further, but it does suggest that the motivational manipulation was influencing the readers' selection of deep processing strategies following the reading of the text. It is not unreasonable to suggest that the "something more" was *effort*. In this sense, it is possible that our understanding of deep processing in unfamiliar text can be further enhanced through a theoretical understanding of how motivational variables associated with effort influence the processing of unfamiliar expository text.

#### *Recommendations for future research*

*Sample.* This study used university-age students for its sample population. As a former secondary school teacher, I was initially interested in using a sample of secondary-school age students but was unable to obtain the necessary sample. It would be worthwhile to undertake a study of different populations in different settings.

*Materials.* The use of history texts in this study may have limited the application of the findings to this particular genre. It has been argued that history texts are narratives with temporal and causal relationships (Britt, et al., 1994) and may therefore not accurately reflect the structure of other texts. It would be worthwhile to use other genres

to determine if the findings in this study were applicable to other genres. The *Nelson-Denny Reading Test* (1993) contains several passages from both the humanities and the sciences with accompanying questions that require students to process the text at both the shallow and deep levels. These passages could easily be adapted to the SPVP format used in this study and the results could be compared to the normed results published with the test.

*Researcher- and teacher-determined inferences.* The determination, by the researcher and classroom teachers, of the inference that should have been drawn may not have reflected the inferences that readers would normally draw during the processing of the texts. To establish a stronger empirical link between possible and actual inferences, it would be useful to collect verbal protocols (Graesser, 1981; Graesser & Clark, 1985; Graesser & Goodman, 1985) from a non-experimental cohort (as was done in this present study to determine topic familiarity) prior to the use of the passages in a study. This would provide the possibility of a more global approach to analyzing extra-textual and text-linking inferences that could emerge in response to questions.

*Experimental task.* It is possible that the relatively benign motivational and processing task manipulations (Graham & Golan, 1991) did not create either the individual or situational conditions necessary for deep processing of text. McKoon & Ratcliffe (1992) suggest that deep processing of text occurs as a result of the reader's adopting specific goals, but these researchers do not indicate the precise nature of these specific goals. It is possible that, before readers will use deep processing strategies, they will need to adopt more specific goals (McKoon & Ratcliffe, 1992) regarding the depth of understanding that they wish to reach while reading familiar topics. It cannot be

assumed, as suggested by Voss (1986), that a reader's goals will necessarily match the teacher's curricular goals or that, when stated by the teacher, will be accepted as the reader's personal goals (Mathewson, 1994). It would be useful to determine the precise nature of readers' goals when they approach both familiar and unfamiliar texts.

Analyzing these specific goals may provide researchers with insights into the types of motivational and processing task manipulation that could directly influence a reader's processing of text.

*Analysis of data.* This study does introduce a new complexity to our theoretical understanding of the motivational processes involved in the *shallow processing* of unfamiliar topics in expository (history) text. In the literature, the term *shallow processing* comprises a unitary concept that does not distinguish between the quantitative aspects of memory for the explicit text. The amount of information recalled following reading is an important educational concern. If readers are to draw inferences following reading (e.g., in response to the teacher's questions), teachers need to know the circumstances under which students will recall more or less of the text. It is therefore important to distinguish between different quantitative levels of shallow processing. Teachers and researchers need to know how differences in recall can be recognized. It would be useful in future research to analyze the responses to questions to determine how the information in the answers might be categorized from a text-analytic perspective. Meyer (1975) developed the concept of *rhetorical structures* to identify superordinate and subordinate ideas in expository text. An analysis based on superordinate and subordinate categories may reveal the types of information recalled that can be associated with either a mastery goal or performance goal orientation.

*Answers to questions.* The use of questions whose purpose was to assess the status of on-line deep processing as measured by reading times of contradictory sentences constrained the subjects in their possible responses. It would be useful to collect free-recall verbal protocols (such as asking students to retell the passage) from subjects following their reading of the texts to permit subjects an opportunity to construct inferences based on what they actually recalled rather than what the researcher believed they should recall.

*Categorization of thought-units.* Although the categorization of textually-correct thought-units and text-connecting thought-units was reasonably straight-forward, the inability to categorize with any certainty both the extra-textual thought units and the errors may have omitted data that would have proved insightful. The first problem is that, unless a researcher is an expert in a particular domain, the researcher cannot know with certainty if an extra-textual thought unit is correct. Any of the information provided in a recall must be based on the subject's prior knowledge and the subject may know more about the topic than does the researcher. There is little comfort for researchers who must fall back on the understanding that any errors in categorization will be spread randomly across all subjects in the experimental treatments. If future research is to have improved validity, a way of categorizing extra-textual thought-units must be devised that addresses the concern.

#### *Concluding statement*

This study has demonstrated that, contrary to existing reading theory, motivational manipulations that orient university-age subjects toward either a mastery

goal orientation or a performance goal orientation influence the amount of text they are able to recall in response to questions that follow the reading of an unfamiliar topic in history text. This is an important educational finding. Classrooms are places where students almost always read unfamiliar topics. It is possible that classroom teachers who establish an environment that promotes a mastery goal orientation will promote in their students the ability to recall more of the explicit text they read. In contrast, this study has not supported theoretical anticipations of deep processing in either familiar or unfamiliar topics in history text. Future research both may determine the precise types of explicit information retained and may provide classroom teachers with further information on the type of information not retained. With this knowledge, teachers may be able to help students fill in both the missing gaps in explicit knowledge and the implicit connections between and among the situations described in history texts.

## REFERENCES

- Aaronson, D. & Ferres, S. (1984). The word-by-word reading paradigm: An experimental and theoretical approach. In D. E. Kieras, & M. A. Just (Eds.), *New methods in reading comprehension research* (pp. 31-68). Hillsdale, NJ: Lawrence Erlbaum.
- Ajzen, I. (1989). Attitude structure and behavior. In A. R. Pratkanis, S. J. Breckler, & A. G. Greenwald (Eds.), *Attitude structure and function* (pp. 241-274). Hillsdale, NJ: Erlbaum.
- Alexander, P. A., Kulikowich, J. M., & Jetton, T. L. (1994). The role of subject-matter knowledge and interest in the processing of linear and non-linear texts. *Review of Educational Research, 64*, 201-252.
- Alexander, P. A., & Jetton, T. L. (2000). Learning from text: A multidimensional and developmental perspective. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research, Volume III* (pp. 285-310). Mahwah, NJ: Lawrence Erlbaum Associates.
- Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*, 261-271.
- Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*, 260-267.

- Anderson, R. C. (1994). Role of the reader's schema in comprehension, learning, and memory. In R. B. Ruddell, M. Rapp Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (4th ed., pp. 469-482). Newark, DE: International Reading Association.
- Anderson, R. C., & Pearson, P. D. (1984). A schema-theoretic view of basic processes in reading comprehension. In P. D. Pearson, R. Barr, M. L. Kamil, & P. Mosenthal (Eds.), *Handbook of reading research, Volume I* (pp. 255-291). White Plains, NY: Longman.
- Anderson, R. C., Reynolds, R. E., Schallert, D. L., & Goetz, E. T. (1976). Frameworks for comprehending discourse. *American Educational Research Journal*, 14, 367-381.
- Armbruster, B. B. (1984). The problem of "inconsiderate text". In G. G. Duffy, L. R. Roehler, & J. Mason (Eds.), *Comprehension instruction: Perspective and suggestions* (pp. 202-217). New York: Longman.
- Asher, S. R. (1980). Topic interest and children's reading comprehension. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension: Perspectives from cognitive psychology, linguistics, artificial intelligence, and education* (pp. 525-534). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Athey, I. (1985). Reading research in the affective domain. In H. Singer, & R. Ruddell (Eds.), *Theoretical models and processes of reading* (pp. 527-558). Newark, DE: International Reading Association.

- Barr, R., Kamil, M. L., Mosenthal, P. B., & Pearson P. D., (Eds.) (1991). *Handbook of reading research, Vol. II*. White Plains, NY: Longman.
- Bartlett, F. C. (1932). *Remembering: An experimental and social study*. Cambridge, MS: Cambridge University Press.
- Balota, D. A., Flores d'Arcais, G. B., & Rayner, K. (Eds.) (1990). *Comprehension processes in reading*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Baumann, J. F. (1984). The effectiveness of a direct instruction paradigm for teaching main idea comprehension. *Reading Research Quarterly*, 20, 93-117.
- Beck, I. L., & McKeown, M. G. (1988). Toward meaningful accounts in history texts for young learners. *Educational Researcher*, 17 (6), 31-39.
- Beck, I. L., & McKeown, M. G. (1991). Conditions of vocabulary acquisition. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research, Volume II* (pp. 789-814). White Plains, NY: Longman.
- Beck, I. L., McKeown, M. G., Sinatra, G. M., & Loxterman, J. A. (1991). Revising social studies text from a text-processing perspective: Evidence of improved comprehensibility. *Reading Research Quarterly*, 26, 251-276.
- Bransford, J. D., Barclay, J. R., & Franks, J. J. (1972). Sentence memory: A constructive versus interpretive approach. *Cognitive Psychology*, 3, 193-209.
- Bransford, J. D., & Johnson, M. K. (1972). Contextual prerequisites for understanding. *Journal of Verbal Learning and Verbal Behavior*, 11, 717-726.
- Bransford, J. D., Sherwood, R., Vye, N. J., Rieser, J. (1986). Teaching thinking and problem solving: Research foundations. *American Psychologist*, 41, 1078-1089.

- Britt, M. A., Rouet, J. F., Georgi, M. C., & Perfetti, C. A. (1994). Learning from history texts: From causal analysis to argument models. In G. Leinhart, I. L. Beck, & C. Stainton (Eds.), *Teaching and learning in history* (pp. 47-84). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Brown, J. I., Fishco, V. V., Hanna, G. (1993). *Nelson-Denny Reading Test* (Form H). Chicago, IL: Riverside.
- Bruce, B., Rubin, A., & Starr, K. (1981). *Why readability formulas fail*. Champaign, IL: Center for the Study of Reading.
- Camperell, K., & Knight, R. S. (1991). Reading research and social studies. In J. P. Shaver (Ed.), *Handbook of research on social studies teaching and learning* (pp. 567-577). New York: Macmillan
- Chiesi, H. L., Spilich, G. J., & Voss, J. F. (1979). Acquisition of domain-related information in relation to high- and low-domain knowledge. *Journal of Verbal Learning and Verbal Behavior*, 18, 257-274.
- Clifton, C. Jr., Frazier, L., & Rayner, K., (Eds.). (1994). *Perspective on sentence processing*. Hillsdale, NJ: Lawrence Erlbaum.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112 (1), 155-159.
- Cohen, L., & Manion, L. (1994). *Research methods in education* (4<sup>th</sup> ed.). New York: Routledge.
- Coulter, J. (1981). Theoretical problems of cognitive science. *Inquiry*, 25, 3-26.
- Cramer, E. H., & Castle, M. (1994). *Fostering the love of reading: The affective domain in reading education*. Newark, DE: International Reading Association.

- Daneman, M. (1988). Introduction. In M. Daneman, G. E. MacKinnon, & T. Waller (Eds.), *Reading research: Advances in theory and practice, Volume 6* (pp. 1-11). San Diego, CA: Academic Press.
- Daneman, M. (1991). Individual differences in reading skills. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research, Volume II* (pp. 512-538). White Plains, NY: Longman.
- Daneman, M., MacKinnon, G. E., & Waller, T. (Eds.). (1988). *Reading research: Advances in theory and practice, Volume 6*. San Diego, CA: Academic Press.
- Dole, J. A., Duffy, G. G., Roehler, L. R., & Pearson, P. D. (1991). Moving from the old to the new: Research on reading comprehension instruction. *Review of Educational Research, 61*, 239-264.
- Dooling, D. J., & Lachman, R. (1972). Effects of comprehension on the retention of prose. *Journal of Experimental Psychology, 88*, 216-222.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 10*, 1040-1048.
- Dweck, C. S., & Elliot, E. S. (1983). Achievement motivation. In P. H. Mussen (Series Ed.) & E. M. Heatherington (Vol. Ed.), *Handbook of child psychology: Vol. 4. Socialization, personality, and social development* (4<sup>th</sup> ed., pp. 643-691). New York: Wiley.
- Elliot, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54*, 5-12.
- Fagan, W. T. (1987). *The learning and teaching of reading: An interactive processes model*. Edmonton, AB: Eolas Publishing.

- Fish, S. (1980). *Is there a text in this class? The authority of interpretive communities*. Cambridge, MA: Harvard University Press.
- Flood, J., Lapp, D., & Fisher, D. (2003). Reading comprehension instruction. In J. Flood, D. Lapp, J. R. Squire, & J. M. Jensen (Eds.), *Handbook of research on teaching the English language arts* (2<sup>nd</sup> ed., pp. 931-941). Mahwah, NJ: Lawrence Erlbaum.
- Fries, C. C. (1963). *Linguistics and reading*. New York: Holt, Rinehart.
- Fry, E. B. (1989). Readability formulas - maligned but valid. *Journal of Reading*, 32, 292-296.
- Garner, R. (1990). When children and adults do not use learning strategies. *Review of Educational Research*, 60, 517-530.
- Goetz, E. T., & Armbruster, B. B. (1980). Psychological correlates of text structure. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension: Perspectives from cognitive psychology, linguistics, artificial intelligence, and education* (pp. 201-220). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Goodlad, J. I. (1976). *Facing the future: Issues in education and schooling*. New York: McGraw Hill.
- Gordon, C., & Pearson, P. D., (1983). *The effects of instruction in metacomprehension and inferencing on children's comprehension abilities*. (Tech. Rep. No. 277). Urbana: IL: University of Illinois, Centre for the Study of Reading.
- Graesser, A. C. (1981). *Prose comprehension beyond the word*. New York: Springer-Verlag.

- Graesser, A. C., & Clark, L. F. (1985). *Structures and procedures of implicit knowledge*. Norwood, NJ: Ablex
- Graesser, A., Golding, J. M., & Long, D. L. (1991). Narrative representation and comprehension. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research, Volume II* (pp. 171-205). White Plains, NY: Longman.
- Graesser, A. C., & Goodman, S. M. (1985). Implicit knowledge, question answering, and the representations of expository text. In B. K. Britton, & J. B. Black (Eds.), *Understanding expository text: A theoretical and practical handbook for analyzing explanatory text* (pp. 109-171). Hillsdale, NJ: Lawrence Erlbaum.
- Graesser, A. C., & Kreuz, R. J. (1993). A theory of inference generation during text comprehension. *Discourse Processes, 16*, 145-160.
- Graesser, A. C., & Riha, J. R. (1984). An application of multiple regression techniques to sentence reading times. In D. E. Kieras, & M. A. Just (Eds.), *New methods in reading comprehension research* (pp. 183-218). Hillsdale, NJ: Lawrence Erlbaum.
- Graesser, A. C., Singer, M., & Trabasso, T. (1994). Constructing inferences during narrative text comprehension. *Psychological Review, 101*, 371-395.
- Graesser, A. C., Swamer, S. S., Baggett, W. B., & Sell, M. A. (1996). New models of deep comprehension. In B. K. Britton, & A. C. Graesser (Eds.), *Models of understanding text* (pp. 1-32). Mahwah, NJ: Lawrence Erlbaum.

- Graesser, A. C., & Zwaan, R. A. (1995). Inference generation and the construction of situation models. In C. A. Weaver, S. Mannes, & C. R. Fletcher (Eds.), *Discourse comprehension: Essays in honor of Walter Kintsch* (pp. 117-140). Mahwah, NJ: Lawrence Erlbaum.
- Graham, S., & Golan, S. (1991). Motivational influences on cognition: Task involvement, ego involvement, and depth of information processing. *Journal of Educational Psychology, 83*, 187-194.
- Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research, Volume III* (pp. 403-422). Mahwah, NJ: Lawrence Erlbaum Associates.
- Guthrie, J.T., & Wigfield, A. (Eds.) (1997). *Reading engagement: Motivating readers through integrated instruction*. Newark, DE: International Reading Association
- Haberlandt, K. (1984). Components of sentence and word reading times. In D. E. Kieras, & M. A. Just (Eds.), *New methods in reading comprehension research* (pp. 219-251). Hillsdale, NJ: Lawrence Erlbaum.
- Hansen, J., & Pearson, P. D. (1983). An instructional study: Improving the inferential comprehension of good and poor fourth-grade readers. *Journal of Educational Psychology, 75*, 821-829.
- Henning, D. G. (1993). On knowing and reading history. *Journal of Reading, 36*, 362-370.
- Hidi, S., & Baird, W. (1988). Strategies for increasing text-based interest and students' recall of expository texts. *Reading Research Quarterly, XIII*, 465-483.

- Humphreys, M., & Revelle, W. (1984). Personality, motivation, and performance: A theory of the relationship between individual differences and information processing. *Psychological Review*, *91*, 153-184.
- International Reading Association. (1986). *Journal of Reading: Special Issue on Vocabulary*. Newark, DE: International Reading Association.
- Irwin, J. W. (1980). The effects of explicitness and clause order on the comprehension of reversible causal relationships. *Reading Research Quarterly*, *14*, 477-488.
- Iser, W. (1980). The reading process: A phenomenological approach. In J. P. Tompkins (Ed.), *Reader-response criticism: From formalism to post structuralism* (pp. 50-69). Baltimore, MA: John Hopkins University Press.
- Jaeger, R. M. (1990). *Statistics: A spectator sport* (2nd ed.). Newbury Park, CA: Sage.
- Jagacinski, C., & Nichols, J. (1984). Conceptions of ability and related affects in task involvement and ego involvement. *Journal of Educational Psychology*, *76*, 909-919.
- Jagacinski, C., & Nichols, J. (1987). Competence and affect in task involvement and ego involvement: The impact of social comparison information. *Journal of Educational Psychology*, *79*, 107-114.
- Johnson, W., & Kieras, D. E. (1982). *The role of prior knowledge in the comprehension of simple technical prose*. Technical Report No. 11, University of Arizona.
- Josten, D. (1996). Students rehashing historical decisions - and loving it!, *Journal of Adolescent & Adult Literacy*, *39*, 566-574.
- Just, M. A., & Carpenter, P. A. (1987). *The psychology of reading and language comprehension*. Newton, MA: Allyn, & Bacon.

- Just, M. A., & Carpenter, P. A. (2004). A theory of reading: From eye fixations to comprehension. In R. B. Ruddell, & N. J. Unrau (Eds.). *Theoretical models and processes of reading* (5<sup>th</sup> ed., pp. 1182-1218). Newark, DE: International Reading Association.
- Just, M. A., Carpenter, P. A., & Wooley, J. (1982). Paradigms and processes in reading comprehension. *Journal of Experimental Psychology: General*, *111*, 228-238.
- Kaestle, C. (1985). The history of literacy and the history of readers. In E. W. Gordon, (Ed.), *Review of Research in Education*, *12*, 11-53.
- Kamil, M. L., Mosenthal, P. B., & Pearson P. D., & Barr, R., (Eds.) (2000). *Handbook of reading research, Vol. III*. Mahwah, NJ: Lawrence Erlbaum.
- Katz, J. J., & Postal, P. M. (1964). *An integrated theory of linguistic descriptions*. Cambridge, MS: MIT Press.
- Keenan, J. M., Potts, G. R., Golding, J. M., & Jennings, T. M. (1990). Which elaborative inferences are drawn during reading? A question of methodologies. In D. A. Balotta, G. B. Flores d'Arcais, & K. Rayner (Eds.), *Comprehension processes in reading* (pp. 377-402). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kintsch, W. (1974). *The representation of meaning in memory*. Hillsdale, NJ: Erlbaum.
- Kintsch, W. (1977). On comprehending stories. In M. A. Just, & P. A. carpenter (Eds.), *Cognitive processes in comprehension*. Hillsdale, NJ: Lawrence Erlbaum.
- Kintsch, W. (1982). Text representations. In W. Otto, & S. White (Eds.), *Reading expository material* (pp. 87-101). New York: Academic Press.

- Kintsch, W. (1989). Learning from text. In L. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser* (pp. 25-46). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kintsch, W. (1992). How readers construct situation models for stories: The role of syntactic cues and causal inferences. In A. F. Healy, S. M. Kosslyn, & Shiffrin, R. M., (Eds.), *From learning processes to cognitive processes: Essays in honor of William K. Estes, Volume 2*, (pp. 261-278). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kintsch, W. (1994). Text comprehension, memory, and learning. *American Psychologist*, 49, 294-303.
- Lapadat, J. C. (2000). Evaluative discourse and achievement motivation: Students' perceptions and theories. *Language and Education*, 14 (1). 37-61.
- Leinhart, G., Beck, I. L., & Stainton, C. (Eds.), (1994). *Teaching and learning in history*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Lesser, H. (1977). The growth of perceived causality in children. *The Journal of Genetic Psychology*, 130. 145-152.
- Long, D. L., Seely, M. R., Oppy, B. J., & Golding, J. M. (1996). The role of inferential processing in reading ability. In B. K. Britton, & A. C. Graesser (Eds.), *Models of understanding text* (pp. 189-214). Mahwah, NJ: Lawrence Erlbaum.
- Lorch, R. F., & van den Broek, R. (1997). Understanding reading comprehension: Current and future contributions of cognitive science. *Contemporary Educational Psychology*, 22, 213-247.

- Magliano, J. P., Trabasso, T., & Graesser, A. C. (1999). Strategic processing during comprehension. *Journal of Educational Psychology, 91*, 615-629.
- Mandler, J. M., & Johnson, N. S. (1977). Remembrance of things parsed: Story structure and recall. *Cognitive psychology, 9*, 111-151.
- Massey, D. D., & Heafner, T. L. (2004). Promoting reading comprehension in social studies. *Journal of Adolescent & Adult Literacy, 48*, 26-40.
- Mathewson, G. C. (1994). Model of attitude influence upon reading and learning to read. In R. B. Ruddell, M. Rapp Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (4<sup>th</sup> ed., pp. 1131-1161). Newark, DE: International Reading Association.
- McInerney, D. M., Roche, L. A., McInerney, V., & Marsh, H. W. (1997). Cultural perspectives on school motivation: The relevance and application of goal theory. *American Educational Research Journal, 34*, 207-236.
- McKeachie, W. J., Pintrich, P. R., & Lin, Y-G. (1985). Learning to learn. In G. d'Ydewelle (Ed.), *Cognition, information processing and motivation* (pp. 601-618). Amsterdam: Elsevier.
- McKenna, M. C., & Kear, D. J. (1990). Measuring attitude toward reading: A new tool for teachers. *The Reading Teacher, 43*, 626-639.
- McKeown, M. G., & Beck, I. L. (1994). Making sense of accounts of history: Why young students don't and how they might. In G. Leinhart, I. L. Beck, & C. Stainton, (Eds.), *Teaching and learning in history* (pp. 1-26). Hillsdale, NJ: Lawrence Erlbaum Associates.

- McKoon, G., & Ratcliff, R. (1992). Inference during reading. *Psychological Review*, 99, 440-466.
- McWhaw, K., & Abrami, P. C. (1997, March). *The interaction of goal orientations and interest on students' use of self-regulated learning strategies*. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.
- Meece, J. L., Blumenfeld, P. C., & Hoyle, R. C. (1988). Students' Goal orientations and cognitive engagement in classroom activities. *Journal of Educational Psychology*, 80, 514-523.
- Meyer, B. J. F. (1975). *The organization of prose and its effect on memory*. Amsterdam: North-Holland.
- Meyer, B. J. F., Brandt, D. M., & Bluth, G. J. (1980). Use of top-level structure in text: Key for reading comprehension of ninth grade students. *Reading Research Quarterly*, 16, 72-103.
- Meyer, B. J. F., & Freedle, R. (1979). *The effects of different discourse types on recall*. Princeton, NJ: Educational Testing Service.
- Meyer, D. K., & Turner, J. C. (2002). Discovering emotion in classroom motivational research. *Educational Psychologist*, 37, 107-114.
- Mitchell, D. C. (1984). An evaluation of subject-paced reading tasks and other methods for investigating immediate processes in reading. In D. E. Kieras, & M. A. Just (Eds.), *New methods in reading comprehension research* (pp. 69-90). Hillsdale, NJ: Lawrence Erlbaum.

- Moravcsik, J. E., & Kintsch, W. (1993). Writing quality, reading skills, and domain knowledge as factors in text comprehension. *Canadian Journal of Experimental Psychology, 47*, 360-374.
- Morton, D. (1988). *Toward tomorrow: Canada in a changing world: History*. Toronto, ON: Harcourt Brace Jovanovich Canada.
- Mulcahy, P. I., & Samuels, S. J. (1987). Problem-solving schemata for text types: A comparison of narrative and expository text structures. *Reading Psychology: An International Quarterly, 8*, 247-256.
- Nagy, W. E., & Scott, J. A. (2004). Vocabulary processes. In R. B. Ruddell, & N. J. Unrau (Eds.). *Theoretical models and processes of reading* (5<sup>th</sup> ed., pp. 574-593). Newark, DE: International Reading Association.
- Nicholls, J. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*, 328-346.
- Nicholls, J., Patashnick, M., & Nolen, S. (1985). Adolescents' theories of education. *Journal of Educational Psychology, 77*, 683-692.
- Nolen, S. B. (1987, April). *The influence of task involvement on use of learning strategies*. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC. (ERIC Document Reproduction No. ED 283852)
- Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction, 5*, 269-287.
- Nolen, S. B., & Haladyna, T. M. (1990a). Motivation and studying in high school science. *Journal of Research in Science Teaching, 27*, 115-126.

- Nolen, S. B., & Haladyna, T. M. (1990b). Personal and environmental influences on students' beliefs about effective study strategies. *Contemporary Educational Psychology, 15*, 116-130.
- Nolen, S. B., & Haladyna, T. M. (1990c). Personal and environmental influences on students' beliefs about effective study strategies. *Contemporary Educational Psychology, 15*, 116-130.
- Noordman, L. G. M., Vonk, W., & Kempff, H. J. (1992). Causal inferences during the reading of expository texts. *Journal of Memory and Language, 31*, 573-590.
- O'Brien, E. J., Shank, D. M., Myers, J. L., & Rayner, K. (1988). Elaborative inferences during reading: Do they occur on-line? *Journal of Experimental Psychology, 14*, 410-420.
- Oldfather, P., & Wigfield, A. (1996). Children's motivation to read. In L. Baker, P. Afflerbach, & D. Reinking (Eds.), *Developing engaged readers in school and home communities* (pp. 89-113). Mahwah, NJ: Erlbaum.
- Otto, W., & White, S. (Eds.). (1982). *Reading expository material*. New York: Academic Press.
- Paris, S. G., Lipson, M. Y., & Wixson, K. K. (1983). Becoming a strategic reader. *Contemporary Educational Psychology, 8*, 293-316.
- Paris, S.G., Wasik, B.A., & Turner, J.C. (1991). The development of strategic readers. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research Volume II* (pp. 609-640). White Plains, NY: Longman.

- Pearson, P. D., & Camperell, K. (1994). Comprehension of text structures. In R. B. Ruddell, M. Rapp Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (4th ed., pp. 448-468). Newark, DE: International Reading Association.
- Pearson, P. D., & Dole, J. A. (1987). Explicit comprehension instruction: A review of the research and a new conceptualization of instruction. *The Elementary School Journal*, 88, 151-165.
- Pearson, P. D., Hansen, J., & Gordon, C. (1979). The effect of background knowledge on young children's comprehension of explicit and implicit information. *Journal of Reading Behavior*, 11, 201-209.
- Pearson, P. D., & Stephens, D. (1994). Learning about literacy: A 30-year journey. In R. B. Ruddell, M. Rapp Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (4th ed., pp. 22-42). Newark, DE: International Reading Association.
- Perfetti, C. A. (1988). Verbal efficiency in reading ability. In M. Daneman, G. E. MacKinnon, & T. G. Waller (Eds.), *Reading research: Advances in theory and practice*, Vol. 6, (pp. 109-143). San Diego, CA: Academic Press.
- Perfetti, C. A. (1989). There are generalized abilities and one of them is reading. In L. B. Resnick (Ed.), *Knowing, learning, and instruction* (pp. 307-336). Hillsdale, NJ: Erlbaum.
- Perfetti, C. A., & Curtis, M. E. (1986). Reading. In R. F. Dillon, & R. J. Sternberg (Eds.), *Cognition and instruction* (pp. 13-57). San Diego, CA: Academic Press.

- Pintrich, P. R., & Schunk, D. H. (2002). *Motivation and education: Theory, research, and applications* (2<sup>nd</sup> ed.). Upper Saddle River, NJ: Pearson Education.
- Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ)* (Tech. Rep. No. 91-B-004). Ann Arbor, MI: The Regents of the University of Michigan.
- Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the motivated strategies for learning questionnaire (MSLQ). *Educational and Psychological Measurement, 53*, 801-813.
- Pressley, M. Johnson, C. J., Symons, S., McGoldrick, J. A., & Kurita, J. A. (1989). Strategies that improve children's memory and comprehension of text. *Elementary School Journal, 90*, 3-32).
- Rex Games. (n.d.). *Tangoes™*. San Francisco, CA: Rex Games, Inc.
- Resnick, D. P., & Resnick, L. B. (1977). The nature of literacy: An historical exploration. *Harvard Educational Review, 47*, 370-385.
- Richgels, D. S., McGee, L. M., Lomax, R. G., & Sheard, C. (1987). Awareness of four texts structures: Effects of recall on expository texts. *Reading Research Quarterly, 22*, 177-196.
- Rowell, J. A., Moss, P. D., & Pope, S. (1990). The construction of meaning from text: Possible effects of different reading strategies. *Educational Psychology, 10*, 39-55.
- Royer, J. M., Carlo, M.S., Dufresne, R., & Mestre, J. (1996). The assessment of levels of domain expertise while reading. *Cognition and Instruction, 14*, 373-498.

- Rubin, A. D., Bruce, B. C., & Brown, J. S. (1976). A process-oriented language for describing aspects of reading comprehension (Tech. Rep. No. 13). Urbana IL: Center for the Study of Reading, University of Illinois.
- Ruddell, R. B., Rapp Ruddell, M., & Singer H. (Eds.), *Theoretical models and processes of reading* (4th ed.). Newark, DE: International Reading Association.
- Ruddell, R. B., & Unrau, N. J. (2004). Reading as a meaning construction process: The reader, the text, and the teacher. In R. B. Ruddell, M. Rapp Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (5<sup>th</sup> ed., pp. 1462-1521). Newark, DE: International Reading Association.
- Rumelhart, D. E. (1975). Notes on a schema for stories. In D. G. Bobrow, & A. Collins (Eds.), *Representation and understanding*. New York: Academic Press.
- Rumelhart, D. E. (1980). Schemata: The building blocks of cognition. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension* (pp. 33-58). Hillsdale, NJ: Erlbaum.
- Rumelhart, D. E. (2004). Toward an interactive model of reading. In R. B. Ruddell, & N. J. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1149-1179). Newark, DE: International Reading Association.
- Sanford, A. J., & Garrod, S. (1982). Memory and attention in text comprehension. In R. S. Nickerson (Ed.), *Attention and performance VIII*. Hillsdale, Lawrence Erlbaum.
- Schallert, D. L. (1982). The significance of knowledge: A synthesis of research related to schema theory. In W. Otto, & S. White (Eds.), *Reading expository material* (pp. 13-48). New York: Academic Press.

- Schuell, T. J. (1986). Cognitive conceptions of learning. *Review of Educational Research, 56*, 411-436.
- Schutz, P. A. (1994). Goals as the transactive point between motivation and cognition. In Pintrich, P. R., Brown, D. R., & Weinstein, C. F. (Eds.), *Student motivation, cognition, and learning: Essays in honor of Wilbert J. McKeachie* (pp. 135-156). Hillsdale, NJ: Lawrence Erlbaum.
- Shirey, L. L., & Reynolds, R. E. (1988). Effect of interest on attention and learning. *Journal of Educational Psychology, 80*, 159-166.
- Singer, M. (1988). Inferences in reading comprehension. In M. Daneman, G. E. McKinnon, & T. Waller (Eds.), *Reading research: Advances in theory and practice, Volume 6* (pp. 177-219). San Diego, CA: Academic Press.
- Singer, M. (1993). Global inferences of text situations. *Discourse Processes, 16*, 161-168.
- Spandel, V., & Stiggins, R. J. (1981). *Direct measure of writing skills: Issues and applications* (rev. ed., pp. 1-11). Portland, OR: Clearinghouse for Applied Performance Testing (CAPT) of the Northwest Regional Educational Laboratory.
- Spaulding, C. L. (1992). The motivation to read and write. In J. W. Irwin, & Mary Anne Doyle, *Reading/writing connections: Learning from research* (pp. 177-201). Newark, DE: International reading Association.
- Spilich, G. J., Vesonder, G. T., Chiesi, H. L., & Voss, J. F. (1979). Text processing of domain-related information for individuals with high and low domain knowledge. *Journal of Verbal Learning and Verbal Behavior, 18*, 275-290).

- Spiro, R. J. (1980). Constructive processes in prose comprehension and recall. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension: Perspectives from cognitive psychology, linguistics, artificial intelligence, and education* (pp. 245-278). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Spiro, R. J., Bruce, B. C., & Brewer W. F., (Eds.) (1980). *Theoretical issues in reading comprehension: Perspectives from cognitive psychology, linguistics, artificial intelligence, and education*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Spivey, N. N., & King, J. R. (1994). Readers and writers composing from sources. In R. B. Ruddell, M. Rapp Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (4th ed., pp. 668-694). Newark, DE: International Reading Association.
- Spyridakis, J. H., & Standahl, T. C. (1987). Signals in expository prose: Effects on reading comprehension. *Reading Research Quarterly*, 22, 285-298.
- Spyridakis, J. H., & Wenger, M. J. (1991). An empirical method of assessing topic familiarity in reading comprehension research. *British Educational Research Journal*, 17, 353-360.
- Steffenhagen, J. (2002, October 25). Reading begins with teachers, expert says. *The Vancouver Sun*, pp. B1, B3.
- Stevens, R. J. (1988). Effects of strategy training on the identification of the main idea of expository passages. *Journal of Educational Psychology*, 80, 21-26.
- Sternberg, R. J. (1998). Abilities are forms of developing expertise. *Educational Researcher*, 27, 11-19.

- Sundberg, A. M. (1995). *Self-paced visual presentation (SPVP) for text: DOS-based millisecond word and sentence timing for IBM PCs.*
- Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3<sup>rd</sup> ed.). New York: HarperCollins.
- Thorndike, E. L. (1917a). Reading as reasoning: A study of mistakes in paragraph reading. *Journal of Educational Psychology*, 8, 323-332.
- Thorndike, E. L. (1917b). The understanding of sentences: A study of errors in reading. *Journal of Educational Psychology*, 18, 98-114. Thorndike, R. L. (1973). *Reading comprehension education in fifteen countries.* New York: Wiley.
- Thorndike, R. L. (1973). *Reading comprehension education in fifteen countries.* New York: Wiley.
- Turner, J. C. (1995). The influence of classroom contexts on young children's motivation for literacy. *Reading Research Quarterly*, 30, 410-441.
- Trabasso, T., & van den Broek, P. (1985). Causal thinking and the representation of narrative events. *Journal of Memory and Language*, 27, 612-630.
- van den Broek, P., Fletcher, C. R., & Risen, K. (1993). Investigations of inferential processes in reading: A theoretical and methodological integration. *Discourse Processes*, 16, 169-180.
- van Dijk, T. A. (1972). *Some aspects of text grammars.* The Hague, Mouton.
- van Dijk, T. A., & Kintsch, W. (1983). *Strategies of discourse comprehension.* San Diego, CA: Academic Press.

- Vonk, W., & Noordman, L. G. M. (1990). On the control of inferences in text understanding. In D. A. Balotta, G. B. Flores d'Arcais, & K. Rayner (Eds.), *Comprehension processes in reading* (pp. 447-464). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Venezky, R. L. (1984). The history of reading research. In R. Barr, M. L. Kamil, P. Mosenthal (Eds.), *Handbook of reading research* (pp. 3-38). New York: Longman.
- Voss, J. F. (1986). Social studies. In R. F. Dillon, & R. J. Sternberg (Eds.), *Cognition and instruction* (pp. 205-239). San Diego, CA: Academic Press.
- Voss, J. F., Fincher-Kiefer, R. H., Greene, T. T., & Post, T. A. (1986). Individual differences in performance: The contrastive approach to knowledge, In R. J. Sternberg (Ed.), *Advances in the psychology of human intelligence* (pp. 297-334). Hillsdale, NJ: Erlbaum
- Walker, C. H., & Meyer, B. J. F. (1980). Integrating different types of information in text. *Journal of Verbal Learning and Verbal Behavior*, 19, 263-275.
- Weaver, III, C. A., & Kintsch, W. (1991). Expository text. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research, Vol. II* (pp. 230-245). White Plains, NY: Longman.
- Wenestam, C-G. (1993). A critique of research on cognition and cognitive processes. *British Journal of Educational Psychology*, 63, 34-45.
- Whitney, P. (1987). Psychological theories of elaborative inferences: Implications for schema-theoretic views of comprehension. *Reading Research Quarterly*, 22, 299-310.

- Wigfield, A. & Asher, S. R. (1984). Social and motivational influences in reading. In P. D. Pearson (Ed.), *Handbook of reading research* (pp. 423-452). New York: Longman.
- Woolfolk, A. E. (1993). *Educational psychology* (5<sup>th</sup> ed.). Needham Heights, MA: Allyn and Bacon.
- Zinar, S. (1990). Fifth-graders recall of propositional content and causal relationships from expository prose. *Journal of Reading Behavior*, 22, 181-199.

## Appendix A

## Consent form

## THE ROLE OF MOTIVATION IN UNDERSTANDING EXPOSITORY TEXTS

This research project will study the role that motivation and cognition play in your understanding of the expository texts you read. Specifically, I am interested in determining the effects--on your understanding of the situations described in expository texts--of

- a) your beliefs about ability and the importance of effort, and
- b) your understanding of the cognitive tasks required to read texts

The research involves one session and will take approximately one hour to complete. Before the experiment, you will be asked to undertake the following activities:

- a) complete a questionnaire that looks at your motivation for and your attitudes about history classes.
- b) complete the vocabulary portion of the Nelson-Denny reading test
- c) provide demographic information about yourself

During the experiment, you will be asked to undertake one or more of the following activities, depending upon the experimental group to which you are assigned:

- a) read summaries of passages and sort according to their familiarity
- b) solve two or three tangram picture puzzles
- c) read, on a computer screen, several passages taken from expository texts and answer one or two questions about each of the passages

While you are reading, a computer will keep track of the amount of time you spend reading the sentences in the passage, and following the reading, you will be asked to answer a question about the passage.

Your participation will be completely voluntary and you can withdraw from the experiment at any time without explanation. Any data collected to that point will be destroyed, and no one, except you and the experimenter, will know you have withdrawn.

Any individual data collected from the experiment will remain confidential. Your name will not be attached to any published results. The signed consent forms and names plus code numbers will be stored separately from the data. Neither your instructor nor the university will have access to any information about individuals that is collected during the study. After the data has been collected and the statistical analysis completed, all identifying records will be immediately destroyed.

If you are interested in volunteering to be a participant in this research study, please print your name and date on the appropriate lines and sign on the signature line below.

## Appendix B

## Example of Modified Text and Contradictory Statement

(Contradictory statement is printed in Italics)

Canada's prosperity in the 1920s had two great flaws. First, it was narrowly based; most Canadians could not afford the cars, refrigerators, and radios that poured from the factories....This led to the second problem. Since 80 percent of what Canada produced was exported, Canada was heavily dependent on the world economy. Europe was groaning under a load of postwar debt. America wanted its loans repaid by Britain and France, but they could not afford to do so....The great depression was born of greed, impatience, and the poverty of the rest of the world. In Canada, the first sign that not all was well with the economy came when the wheat pools tried to sell their 1928 crop. Two years earlier wheat had sold for \$2 per bushel (\$73 per tonne). But the huge harvest now faced competition from other countries. It eventually sold for just over \$1 per bushel (\$40 per tonne). A drought killed much of the 1929 crop, but prices still fell.... Europe had no money to buy Canadian goods. Trying to protect its own industries, the United States raised its tariffs to the highest level ever. Canadian factories began to close, and unemployment rose sharply. Many shareholders in public companies decided to sell while they could still get some money for their stock. As more and more people tried to sell, prices fell swiftly. *These circumstances assured profitable times for investors.* Optimists ignored the signs and watched their fortunes collapse when the stock markets in the United States and Canada crashed in October, 1929.

## Appendix C

### Examples of Questions for Text

1. Before the depression, what conditions existed that indicated the Canadian economy was in trouble?
2. How did economic conditions before the depression affect investors?
3. Why did the conditions affect investors this way?

## Appendix D

## Modified Motivated Strategies for Learning Questionnaire Instruction Sheet

The Motivation Questionnaire can be completed without supervision.

If you have arrived early, please take the time now to fill out the Motivation Questionnaire on the inside pages of this booklet.

Please read carefully the directions at the top of the page 2. It is important that you place yourself in the psychological frame of a history student while responding to the statements.

Before beginning the Motivation Questionnaire, please place the numbered identification label from the centre column of the label sheet in the space provided below. Please ensure that the numbered label that you place in the space has the same number as the label on which your name is printed.

Please do NOT place your name anywhere on this booklet.

Affix the numbered label from the centre column of the label sheet within this space. Ensure the number matches the number of the label on which your name appears.

## DEMOGRAPHIC INFORMATION

Gender (circle): M F Age (circle): 17-21 21-26 27-31  
31+

Last history course completed: SS 11 Hist. 12 Other: \_\_\_\_\_

School from which you graduated: \_\_\_\_\_ Year: \_\_\_\_\_

---

## Appendix E

## MOTIVATION QUESTIONNAIRE

Imagine you are taking a history course or think back to the time in secondary school when you were taking a history course. Please read and respond to the statements in the following questionnaire based on your beliefs about your motivation for and attitudes about history classes.

There are no right or wrong answers; just answer as accurately as possible based on your beliefs about the statement as it applies to you during history classes.

Use the scale below to respond to the statements. If you believe the statement is (or was) very true of you, circle 7; if the statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

	Not at all true of me					very true of me				
	1	2	3	4	5	6	7			
1. In history class, I prefer course material that really challenges me so I can learn new things.				1	2	3	4	5	6	7
2. If I study history in appropriate ways, then I will be able to learn the material.				1	2	3	4	5	6	7
3. In history class, I want to do everything as easily as possible so I won't have to work very hard.				1	2	3	4	5	6	7
4. I think I will be able to use what I learn in history class in my other classes.				1	2	3	4	5	6	7
5. I believe I will receive an excellent grade in history courses.				1	2	3	4	5	6	7
6. I'm certain I can understand the most difficult material presented in the historical reading material.				1	2	3	4	5	6	7

- |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 7. Getting a good grade in history class is the most satisfying thing for me.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. During history class, I checked to see what other people were doing and then did it also.  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. It is my own fault if I don't learn the material in history class.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. It is important for me to learn all the course material in history class.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. The most important thing for me is to improve my grade point average, so my main concern in history class is to get a good grade. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. I'm confident I can learn the basic concepts taught in history classes.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. During history class, I just do my work and hope it is correct.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. If I can, I want to get better grades in history than most of the other students.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. During history class, I just want to do what I am supposed to do and get it done.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16. I'm confident I can understand the most complex material presented by the teacher during the class.                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. In history class, I prefer course material that arouses my curiosity, even if it is difficult to learn.                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18. If I try hard enough, then I will understand the course material.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19. In history class, I guess a lot so I can finish quickly.  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

20. I'm confident that I can do an excellent job on the assignments and tests in history.	1	2	3	4	5	6	7
21. I expect to do well in history courses.	1	2	3	4	5	6	7
22. The most satisfying thing for me in history class is trying to understand the content as thoroughly as possible.	1	2	3	4	5	6	7
23. I think the course material in history class is important for me to learn.	1	2	3	4	5	6	7
24. When I have the opportunity in history class, I choose assignments that I can learn from even if it doesn't guarantee a good grade.	1	2	3	4	5	6	7
25. If I don't understand the course material, it's because I don't try hard enough.	1	2	3	4	5	6	7
26. I like the subject matter in history classes.	1	2	3	4	5	6	7
27. Understanding the subject matter in history class is very important to me.	1	2	3	4	5	6	7
28. I want to do as little as possible in history class.	1	2	3	4	5	6	7
29. I'm certain I can master the skills taught in history class.	1	2	3	4	5	6	7
30. I want to do well in history class because it is important to show my ability to my family, friends, and others.	1	2	3	4	5	6	7
31. Considering the difficulty of history class, the teacher, and my skills, I think I will do well in history.	1	2	3	4	5	6	7
32. In history class, I skip the hard parts.	1	2	3	4	5	6	7

## Appendix F

## Evaluation of topic familiarity ratings following experimental tasks

If the topic was not at all familiar to you BEFORE you did the activity, circle the number 1 on the scale. If the topic was very familiar to you before you did the activity, circle the number 5 on the scale. If the topic was more or less familiar to you BEFORE you did the activity, circle the number between 1 and 5 that best describes your familiarity with the topic.

not at all  
familiar to me

very familiar  
to me

1                    2                    3                    4                    5

Topic: The depression in Canada

1                    2                    3                    4                    5

Topic: India after independence

1                    2                    3                    4                    5

Topic: Americans in Vietnam

1                    2                    3                    4                    5

Topic: Austrian Empire

1                    2                    3                    4                    5

Topic: League of Nations

1                    2                    3                    4                    5

Topic: Islamic Revolution

1                    2                    3                    4                    5