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The Effect of goal orientation of attention, learning, and metacognitive awareness

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THE EFFECT OF GOAL ORIENTATION ON ATTENTION, LEARNING, AND METACOGNITIVE AWARENESS

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ABSTRACT

The Effect of Goal Orientation on Attention, Learning, and Metacognitive Awareness

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An experimental study was conducted to examine whether achievement goals affect attention, comprehension, and metacognition. One hundred and twenty undergraduate students enrolled in introductory educational psychology classes participated. Students were randomly assigned to one of four goal groups (mastery, performance approach, performance avoidance, or control group) and one of three question groups (emotions, brain, and no questions).

The study was conducted in two sessions. First, students were given a reading test, and questionnaires to measure their prior knowledge and personal goals. Second, students read the text on a computer. Then they completed an interest questionnaire, a manipulation check, a post test and an interview to assess their metacognition.

A 4 (Type of Goal Instruction: mastery, performance approach, performance avoidance, and control) X 3 (Type of Questions: emotion, brain, and no questions) X 3 (Type of Text Segment Information: emotion, brain, and neutral) mixed factorial design was used. Type of goal instruction and type of questions were between subject factors; type of text segment information was a within-subject factor. The dependent measures

were attention, comprehension, and metacognitive awareness. Personal goal orientation, prior knowledge, and reading ability were covariates.

The analyses were conducted in seven parts: 1) a series of repeated measures ANOVAs were ran as general analyses, 2) causal analyses was used to determine whether attention mediated the relationship between goals and learning, 3) Attention data were analyzed to determine when participants became aware, 4) ANOVAs were ran to examine whether there were differences among goal groups on metacognition, 5) interview data were examined to determine whether participants differed on reading strategy use after they became metacognitively aware, 6), standard regression was conducted to test whether metacognition affected the amount of time spent on salient and non-salient text information, and 7) path analysis was used to test whether metacognition was a causal mediating variable between goals and learning. Results show that the attention was a partial mediating variable between goals and learning; metacognition mediated goals and learning; a mastery goal leads to better metacognition; and metacogntion affect attention. Theoretical and educational implications of the study's findings are discussed.

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CHAPTER 1

INTRODUCTION

Theoretical Framework

Achievement goal theory has evolved as a major research area in achievement motivation (Midgley, Kaplan, Middleton, & Maehr, 1998). Goal orientation focuses on the reasons individuals engage in achievement-related behaviors (Kaplan & Maehr, 2007; Midgley, Kaplan, & Middleton, 2001). Goal theorists have proposed several types of goal orientations to explain the reason why individuals engage in achievement behaviors. One group of goal theorists conceptualized a dichotomous framework of goals whereby two major classes of goals were identified: learning and performance goals (see Dweck, 1986; Dweck & Elliott, 1983; Nicholls & Dweck, 1979). Learning goals are goals individuals adopt to increase their competence and performance goals are goals to demonstrate competence or avoid demonstrating incompetence when engaging in a task.

Other researchers proposed a trichotomous framework whereby performance goal was divided into approach and avoidance goal orientations (see Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Middleton & Midgley, 1997; Pintrich, 2000b). Essentially, performance-approach goals entail engaging in achievement tasks to demonstrate ability, whereas performance-avoidance goals involve disengaging in achievement tasks in order not to appear incompetent (Eccles & Wigfield, 2002). Mastery goal is defined the same as in the dichotomous framework. The present study will apply the trichotomous goal framework.

Generally, mastery or learning goals have been found to positively correlate with adaptive learning patterns and outcomes (see Ames & Archer, 1988; Bereby-Meyer & Kaplan, 2005; Butler, 1987; Elliott & Dweck, 1988; Elliott & McGregor, 2001; Elliott, McGregor, & Gable, 1999; Jagacinski & Nicholls, 1987; Newman, 1998; Pintrich & De Groot, 1990a). However, the findings relating to performance goals (as defined in the dichotomous framework) have been less consistent. Some studies link performance goals to maladaptive patterns of learning (Ames, 1992a; Ames & Archer, 1988; Anderman, Griesinger, & Westerfield, 1998; Dweck, 1986; Dweck & Leggett, 1988; Jagacinski & Nicholls, 1987; Newman, 1998), whereas others show positive relationships between performance goals and adaptive patterns of learning (Elliott, 1999; Pintrich 2000b; Urdan, 1997; Wolters, Yu, & Pintrich, 1996).

Performance approach goals have been found to correlate with positive academic variables (Elliott, 1999; Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Pajares, Britner, & Valiante, 2000; Skaalvik, 1997; Wolters et al., 1996). Also, performance approach goals have been linked to negative outcomes (Elliot & McGregor, 1999; Middleton, 2001; Middleton & Midgley, 1997; Skaalvik, 1997; Middleton & Midgley, 1997). Performance avoidance goals have been consistently associated with maladaptive patterns (Elliot & Church, 1997; Middleton & Midgley, 1997; Urdan, Ryan, Anderman, & Gheen, 2002).

Goal orientation researchers have also found differences among students' goals and their metacognitive awareness. Studies have consistently shown significant connections among metacognitive strategies, cognitive engagement, and goal orientation (e.g. Ames & Archer, 1988; Elliott et al., 1999; Meece, Blumenfeld, & Hoyle, 1988; Middleton &

Midgley, 1997; Pintrich & Garcia, 1991; Valle et al., 2003; Wolters et al., 1996). A mastery goal has been consistently correlated to metacognitive awareness and cognitive engagement, whereas performance goals have been linked to poor metacognitive strategies. Mastery goal orientation was also found to be significantly related to performance when metacognitive strategies were mediating variables (Vrugt & Oort, 2008).

Reading researchers have also focused attention on motivation/goal orientation in reading. This is particularly important for my purpose since reading was the context of the study. They proposed that readers use both cognitive and motivational processes in any reading situation (Guthrie & Wigfield, 1999; Meece & Miller, 1999). Empirical studies have found that achievement goals are linked to the amount of time readers spend reading, reading comprehension, and reading strategy use (He, 2007; Meece & Miller, 1999; Wigfield & Guthrie, 1997). Mastery goals have been consistently linked to adaptive reading patterns and outcomes.

These studies have demonstrated relationships between students' goals and several learning outcomes, suggesting that goal orientation is an important factor in students' academic outcomes. Although researchers have identified metacognitive strategies as possible mediating variables between goal orientations and learning (e.g. Vrugt & Oort, 2008), a causal mechanism whereby goals can affect learning have not been identified. What is one causal mechanism that underlies the relationship between goals and learning? Can the relationship among goals, metacognition, and learning be causally explained? In the context of reading, is it plausible that students' goal orientations can affect learning of text information when attention is accounted for? One line of research,

the Selective Attention Strategy (SAS) has looked at the possibility of selective attention causally mediating the relationship between several learner variables and learning.

Selective Attention Strategy (SAS) researchers and theorists have established that readers pay more attention to important text information and learn it better than unimportant information (Cirilo & Foss, 1980; Goetz, Schallert, Reynolds, & Radin, 1983; Hidi, 1995; Reynolds, 1992; Reynolds & Anderson, 1982).

They assert that readers superficially process text segments and rate them for their importance. That initial evaluation of importance of the segments determines if they pay more or less attention to them. The increased attention allocation or processes supported by the increased attention allocation have been shown to be a causal mediating factor in the relationship between importance and learning. This is essentially the Selective Attention Strategy (SAS).

To test the SAS, text element importance has been manipulated via text variables (Cirilo & Foss, 1980; Johnson, 1970; Kintsch & van Dijk, 1978), task structure (Goetz et al., 1983; Kaakinen, Hyona, & Keenan, 2003; Lapan & Reynolds, 1994; Reynolds & Anderson, 1982), and reader characteristics (Goetz et al., 1983). These studies have empirically validated the SAS. However, other studies have provided counter-evidence of the SAS (e.g., Britton, Meyer, Simpson, Holdredge, & Curry, 1979; Reynolds & Schwartz, 1983; Shirey & Reynolds, 1988), meaning that more important information was remembered better than unimportant information; however readers did not necessarily pay more attention to important information.

SAS researchers used measures of attention duration and attention intensity to assess attention (Reynolds & Anderson, 1982; Reynolds & Shirey, 1988). Attention duration

was measured by calculating the time readers spent on a text or segments of a text. The more time one spends on a text, the more attention one is devoting to that text. Attention intensity was assessed by a secondary task reaction method whereby readers were to respond to a tone or click while reading. The more time it took the reader to react to the secondary task/probe, the more cognitive effort the reader was likely devoting to the text (Britton et al., 1979; Reynolds & Anderson, 1982; Reynolds & Shirey, 1988).

"Importance" in the SAS framework meant marked *by significant worth* (Reynolds, 1992). However, as SAS research progressed, researchers started to question the utility of the term importance to describe elements of text significance. (Reynolds, 1992; Reynolds et al., 1989). For example, they questioned whether someone who is assigned a perspective by which to read a text may find significant worth in that text. As a result, importance was changed to salience (*the property of standing out*), as they thought that salience would better represent the findings in SAS research (see Reynolds, 1992; Reynolds et al., 1989). Readers should note that SAS studies cited in this paper before 1989 used the term importance whereas studies after that period used *"salience"*. The term may also be used interchangeably throughout this paper.

In recent years, researchers have adopted the selective attention framework to study relevance instruction and how it affects attention and reading comprehension. Results have replicated findings from earlier research in task-based salience, attention, and learning. That is, relevance affects attention and learning when the task is manipulated to influence salience/relevance (e.g., Lehman & Schraw, 2002; McCrudden, Schraw, & Hartley, 2006; McCrudden, Schraw, & Kambe, 2005; Seifert, 1993; Wood, Pressley, & Winne, 1990).

Researchers have identified a critical component of the SAS – metacognitive awareness. Studies have demonstrated differences in the ways different readers use the SAS, and these differences were thought to result from differences in metacognitive awareness and learning strategies (Lapan & Reynolds, 1994; Reynolds, Shepard, Lapan, Kreek, & Goetz, 1990). They found that readers with higher reading abilities tended to use the SAS more efficiently than lower ability readers; more successful readers use better metacognitive awareness when using the SAS.

So far, SAS researchers have used only two reader variables to test the SAS: interest and background knowledge (see Anderson, Shirey, Wilson, & Fielding, 1984; Goetz et al., 1983; Shirey & Reynolds, 1988). Although motivation was conceptualized as one likely reader characteristic that may influence text salience (see Reynolds, 1992), the variable was never tested in the model. However, the SAS may help explain the relationships between other reader characteristics, specifically achievement goal orientations, metacognition, and learning outcomes. The present study examined these relationships using the SAS model.

Purpose and Description of the Study

The current study tested the effect of goal orientation on attention, learning, and metacognitive awareness using SAS methodology. In other words, the study attempted to identify and measure the variables that underlie or mediate the effect of goal orientation on learning**.** Specifically, I investigated how goal orientations affect learning for texts using previously established selective attention methodology. Also, the link between goal

orientations and metacognitive awareness was examined using the selective attention model.

I investigated these effects by manipulating goal orientations. Participants were randomly placed into four goal orientation groups (mastery, performance approach, performance avoidance, and control). Participants read a cognitive neuroscience text about the brain and emotions on the computer and attention was assessed using time spent on text information. Some participants had questions inserted throughout their text. That is, participants were randomly assigned either emotion questions, brain questions or no question. An interview was used to determine when individuals became metacognitively aware of their assigned questions and to assess the types of reading strategies they adopted. A post test was used to measure learning.

Research Questions and Hypotheses

Four research questions were asked in the current study: 1) Does attention mediate the relationship between goals and learning?, 2) Does goal orientation affect metacognitive awareness?, 3) Does metacognitive awareness affect attention on salient and less salient text elements?, and 4) Does metacognitive awareness mediate the relationship between goals and learning?

I predict that goal orientations will affect learning for text when attention is a causal mediating variable. Mastery goal orientation will have the largest significant effect on attention and comprehension. I hypothesize that attention will mediate the relationship between goals and comprehension.

The different goal orientations will differ on metacognitive awareness. Mastery goal orientation will have show the largest effect on metacognition. I predict that meta-cognitive awareness will affect attention on salient and non-salient text information. That is, as participants become more meta-cognitively aware, they will pay more attention to text information that their assigned questions make salient and vice versa. Last, metacognitive awareness will be a causal mediating variable between goal orientations and learning.

Significance of the Study

Identifying the relationship among students' goal orientation, attention, and learning is very critical at the college level. In December 2005, the United States Department of Education published results from the National Assessment on Adult Literacy (NAAL) conducted in 2003. Results show that only 31 percent of college graduates were proficient in reading and understanding prose text. This signifies a disappointing decline in prose literacy among college students because in 1992, 40 percent of college graduates were proficient. This means that within a period of 11 years, prose literacy declined by nearly ten percent. This finding indicates that college literacy is a very critical issue and identifying factors that contribute to these alarming rates are crucial. More research is needed that focuses on identifying the links among prose literacy and other academic factors. Could it be that the goal orientations students adopt affect their metacognitve awareness of text information, the attention they pay to the text, and their comprehension of that text? The current research sought to explore these relationships. By better understanding relations among goals, attention, metacognition, and comprehension,

instructional techniques can be adopted at the college level that encourage the adoption of more adaptive goal orientations, attention and metacognitive strategies that can raise the prose literacy proficiency rates in college.

Moreover, this study may advance theory in the reading and goal orientation literatures and provide a useful parallel between selective attention research with motivation and self-regulated learning. It may also allow for more grounded and warranted theoretical connections among motivation, metacognition, and learning outcomes.

CHAPTER 2

REVIEW OF RELATED LITERATURE

The Historical Perspective of Achievement Goal Theory

In the past two decades, achievement goal theory has gained keen interest from many education researchers; hence, exhaustive research has been conducted in the area (Ames, 1992; Dweck & Leggett, 1998). Consequently, it has evolved as a major research area in achievement motivation (Midgley et al., 1998).

Achievement goal theory has its roots dating back to the early years of motivational psychology (Pintrich & Schunk, 1996). Trait and humanistic theories of motivation have particularly influenced work in achievement motivation and, in, turn achievement goal theory (Pintrich & Schunk, 1996). An extensive review of these theories is beyond the scope of this paper; thus, a brief review will be presented here.

The trait and humanistic theories of motivation departed from the traditional way of understanding motivation through mechanistic observable behaviors. They laid the groundwork for achievement motivation theorists to investigate the basic energy or motive for achievement related behaviors (see Pintrich & Schunk, 1996). I will review one prominent trait theorist, Henry Murray, and one prominent humanistic theorist, Abraham Maslow, who contributed significantly to achievement goal theory.

Henry Murray believed needs are the basic biological components of our motivational processes and are stable personality traits. He proposed that needs are physiological in nature and influence how we think, perceive things, and behave (Mischel & Shoda, 2000; Murray, 1938; Pintrich & Schunk, 1996). Although he thought that the individual is in

control of his/her needs, he proposed that needs are also controlled by the context in which the individual is situated (Murray, 1938).

For example, a psychology teacher might outline his/her objectives and expectations for a passing grade in the class that may be established as the norm for the class. However, each individual may walk into the classroom with his/her own needs. One student may have a need just to make friends (need for affiliation) or just to understand without caring about a passing grade (need for understanding).

Murray saw an interplay between the environment and the person. He developed the Thematic Apperception Test (TAT) to measure needs and proposed a taxonomy of 20 needs ranging from the need for abasement to the need for understanding spanning every context and human physical and psychological functioning (Murray, 1938; Pintrich & Schunk, 1996).

Abraham Maslow also focused on needs as the driving force underlying motivation. He proposed five needs that progressed in hierarchical form ranging from physiological to self-actualization needs. The higher level needs could not be satisfied until an individual satisfies the lower level needs. According to Maslow, individuals progress from physiological needs, then to safety needs, followed by sense of belonging, then esteem needs and finally self-actualization needs. Maslow categorized these needs into two broad types of needs: deficiency needs and growth needs. The deficiency needs include the first four needs and the growth need includes self-actualization that is characterized by the need to know and understand things (Wood, Wood, & Boyd, 2005).

Trait and humanistic theories focused on needs as the basic elements of motivation. Over time, these needs models became rather deficient in that the number of needs that

one could identify became quite numerous and difficult to manage. Thereby, needs were re-conceptualized as goals (Pintrich & Schunk, 1996) and influential work in achievement goal theory followed.

Achievement Goal Theory

Goal theory has developed within a social-cognitive approach: it emphasizes cognitive factors, such as how individuals interpret situations, the events of situations, and how they process information about these situations (Dweck, 1986; Dweck & Leggett, 1988). Achievement goal theory emphasizes that people have a system of beliefs, emotions, perceptions, and attributions that cause them to approach achievement activities in specific ways (Brdar, Rijavec, & Loncaric, 2006).

The underlying assumption is that individuals construct cognitive representations of motives for academic-related situations (Ames, 1992; Dweck, 1986). Pintrich (2000a) proposed that goals are well structured parts of an individual's cognitive processes that include a subjective theory of the purposes of achievement situations, how competence is defined, and beliefs about effort and ability. Essentially, goal orientation focuses on why individuals engage in achievement-related behaviors (Kaplan & Maehr, 2007; Midgley, Kaplan, & Middleton, 2001). In any achievement situation, goal orientations are believed to be an integral and critical part of the experience, not only guiding cognitive processes, but influencing behavior and emotions (Ames, 1992; Elliot & Dweck, 1988).

Nature of Goal Orientations

One critical aspect of goal orientations is the construction of and nature of these goal frames. Goal orientation is thought to arise from schemas and scripts that guide the cognitive and affective processes of the individual in achievement situations (Kaplan & Maehr, 2007). Two major perspectives have been formulated to explain the source of these schemata that form the basis of goal orientation: schemata for achievement situations and self-schemata (Kaplan & Maehr, 2007).

Goal Orientation and Situation Schemata

Goal orientations as cognitive-affective frames are constructed from schemata that are tied to specific academic situations. That is, individuals associate different aspects of the environment to specific goal orientations and in turn, these goals and behaviors associated with the goals are adopted (Cantor, Mischel, & Schwartz, 1982; Kaplan & Maehr, 2007)**.** These situations become prototypes from which individuals' actions, thoughts, and feelings are guided. Essentially, they become schemata that drive achievement goal adoption. These situation schemata can emerge from one's culture (Maehr & Nicholls, 1980), from sub-cultures within the larger culture including specific classroom settings (Linnenbrink & Pintrich, 2001; Meece, 1991; Nolen & Haladyna, 1990a; Roeser, Midgley, & Urdan, 1996; Urdan & Midgley, 2003), and from interactions with other individuals, especially with teachers (Kaplan & Maehr, 2007).

Goal Orientation and Self Schemata

Theorists have also identified self schemata as critical in influencing adoption of goal orientations (Garcia & Pintrich, 1994). Individuals have specific ideas about their cognitive and affective processes; these ideas are essentially beliefs that emerge as

schemata, which in turn, influence the goal orientation that individuals adopt, prompting them to think, feel, and act in specific ways for certain achievement situations.

Theorists have proposed and tested different perspectives on self-schemata as they relate to the nature of goal orientations. For instance, Dweck and colleagues (see Dweck, 1986; Dweck Chiu, & Hong, 1995a; Dweck & Legget, 1988) asserted that goal orientations emerge from individuals' beliefs about their intelligence. They suggested that people hold two competing theories about the nature of their own intelligence: incremental and entity theories of intelligence. Individuals who espouse the incremental theory of intelligence think that intelligence are malleable, increasable, and controllable. Individuals who hold an incremental belief about their own intelligence tend to activate a schema that may influence the individual to adopt a more adaptive goal orientation. On the other hand, individuals who believe in the entity theory of intelligence believe that intelligence is fixed and uncontrollable. In an achievement-related situation, scripts that activate maladaptive goal orientations are activated and adopted by these individuals. These theories of an individual's intelligence may have emerged from one's culture or subculture (Cain & Dweck, 1995; Smiley & Dweck, 1994). According to Dweck and colleagues, these beliefs may stem directly from the way parents and teachers evaluate children's learning processes.

Nicholls (1984, 1990) conceptualized a different perspective on self-schemata. He argued that individuals have different beliefs about their own ability that activate specific schemas that influence their goal orientations. Some individuals believe that effort influences ability while others believe that effort and ability are independent of each other. Individuals who believe that effort is independent of ability may adopt a

maladaptive goal orientation, whereas individuals who believe that effort and ability are inextricably connected may adopt an adaptive goal orientation. However, Nicholls also proposed that situation schemas (e.g., the task, the classroom setting) may sometimes influence individuals to adopt goal orientations different from those influenced by their own self-schemas (Nicholls, 1989; 1992). According to Nicholls, these beliefs about ability are one part developmental but may also emerge from individuals' personal experiences.

Summary

In sum, the basic foundational elements of goal orientations are schemata and scripts. One approach has identified situation schemata as the most critical influence on goal orientation and another - self-schemata. The different perspectives on the nature of goal orientations have influenced the way theorists have conceptualized goal orientations. However, despite differing views on the nature of goals, theorists have identified complementary types of goals that form two major goal frameworks that drive research in the field of goal orientation.

The Dichotomous Framework of Goal Orientation

One group of goal theorists conceptualized a dichotomous framework of goal orientation whereby two major classes of goals were identified. For example, Dweck and her colleagues (see, Dweck, 1986; Dweck & Elliott, 1983; Nicholls & Dweck, 1979) identified two major types of goals: learning or mastery and performance goals. A learning goal orientation is a goal to increase competence. A performance goal is a goal to demonstrate competence or avoid demonstrating incompetence when engaging in a task. Accordingly, performance goals are rooted in an interpersonal outlook of

competence (relative to others), whereas a mastery goal is grounded in an intrapersonal perspective, where competence is assessed relative to oneself.

Other theorists have provided complementary definitions of the dichotomous framework of performance and mastery goals. For example, Nicholls (see Nicholls, 1984, 1989) identified ego-involved goals (performance) and task-involved goals (mastery) as two major goal patterns. Individuals who pursue task-involved goals seek to master tasks. Their goal is to get a firm understanding of new skills. In contrast, individuals pursuing ego-involved goals concentrate on demonstrating high ability in relation to others. They also seek to hide low ability.

Empirical Research on the Dichotomous Framework

Experimental and correlational research has supported the dichotomous goal framework and has identified different relationships between mastery and performance goals with other academic constructs. Experimental studies primarily comprised researchers manipulating students' goals by way of instructions to examine their effects on various learning outcomes. Given that the current research will be using goal manipulation, I find it useful to review these types of studies more extensively.

Elliott and Dweck (1988) performed an experiment to examine the effect of goal orientations on several academic outcomes. Elementary school students were randomly placed in either a learning (mastery) or performance task group. Goal groups were formed by providing students with goal instructions that asked students to adopt either a mastery, (participants were told that the task would help them in school and their studies) or a performance goal (participants were told that their performance on the task was being filmed and that experts will grade their assignment). Students were also divided

into low and high ability groups. Assignment to the ability groups was based on performance on a pattern recognition task.

In the experiment, students worked on a card discrimination task. Students' task choice, problem-solving effectiveness, and verbalizations of negative affect during the task were collected. Results demonstrated that students in the learning group compared to the performance group chose more challenging tasks and had better problem-solving strategies. The mastery students also coped positively, persisted on the task, and expressed positive emotions. This study provided evidence of a connection between mastery goal adoption and adaptive learning patterns.

Similarly, Bereby-Meyer and Kaplan (2005) performed two experiments to examine the effects of goal orientation on learning and transfer of problem-solving strategies. Third and sixth-grade students participated in the experiment. Participants were randomly placed in either a mastery goal group (asked to learn the task), performance goal group, (asked to demonstrate their ability to perform the task), or a control group (asked to complete a task). Subjects were then given a training task to identify pairs of singers. After the completion of this phase of the experiment, students were given a card game to identify pairs of shapes that complete a rectangle. This task was considered the transfer task as it was similar to the task in phase one. Results showed that students in the mastery goal group, irrespective of age, had a higher rate of transfer than those in the performance goal group. Experiment two was similar to experiment one except in the second experiment, students were given goal manipulation instructions between the first and second tasks. Results were replicated in this experiment. Again, mastery goals were proven to be the more adaptive goal orientation.

Grahm and Golan (1991) conducted an experiment to evaluate the relationship between goal orientation and levels of information processing. Fifth and sixth grade students were randomly assigned to one of three goal groups. Students assigned to the task involved (learning goal) group were asked to master the experimental task. Students in the ego-involved group (performance goal) were asked to try to perform better than the other students in the study. The control goal group was simply asked to complete the task.

The task tested levels of processing in which students were given questions and stimulus words about the questions to which they replied either yes or no. There were three types of questions: rhyme words, category words, and sentence words. Rhyming questions were assumed to require shallower processing than the questions relating to category and sentence words.

Results were consistent with previous research on goal orientation and achievement outcomes; students in the ego-involved group recalled fewer category words than the task-involved and control groups. Ego-involved group also remembered fewer sentence words than the task-involved group.

Numerous correlational studies tested and supported the dichotomous model of goal orientation. These researchers identified varying relationships between mastery and performance goals with other academic outcomes. Mastery goals were found to positively correlate with persistence and effort (Elliott et al., 1999; Pintrich & De Groot, 1990), help-seeking (Newman, 1998), better self-regulation (Pintrich & De Groot, 1990), attribution of success to effort (Ames & Archer, 1988), positive affect following successful effort (Jagacinski & Nicholls, 1987), preference for challenging tasks (Ames

& Archer, 1988), adoption of deep learning strategies (Elliott et al., 1999), positive attitudes (Ames & Archer, 1988), better retention of information (Elliott & McGregor, 1999), and intrinsic interest in learning (Butler, 1987). Hence, it is clear that there is significant empirical evidence suggesting that mastery goals are linked to positive cognitive, affective, and learning outcomes.

However, the findings relating to performance goals have been inconsistent. Some studies link performance goals to maladaptive patterns of learning, such as cheating (Anderman et al., 1998), reluctance to seek academic assistance (Newman, 1998), avoidance of challenging tasks (Dweck, 1986; Dweck & Leggett, 1988), use of surface learning rather than deep learning (Ames, 1992a), negative approach to ability (Ames & Archer, 1988), and negative affect following failure (Jagacinski & Nicholls, 1987). However, others show positive relationships between performance goals and adaptive patterns of learning (Pintrich 2000b; Wolters et al., 1996). For example, a performance goal has been positively linked to self efficacy, adoption of effective strategies, grades, positive attitudes, and affects (Elliott, 1999; Urdan, 1997).

The Trichotomous Framework of Goal Orientation

Researchers have theorized about an alternative framework that partitioned the performance goal orientations into approach and avoidance motivational goal orientations (see Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Middleton & Midgley, 1997; Pintrich, 2000b). This distinction arose in part because of the inconsistent evidence about the effects of a performance oriented goal on various academic outcomes (Eccles & Wigfield, 2002; Kaplan & Maehr, 2007). These theorists reorganized the dichotomy of

achievement goals into a trichotomous framework: mastery, performance-approach, and performance-avoidance.

Essentially, performance-approach goals entail engaging in achievement tasks to demonstrate ability, whereas performance-avoidance goals involve disengaging in achievement tasks in order not to appear incompetent (Eccles & Wigfield, 2002). Developing the trichotomous framework of goal orientation helped clarify the inconsistencies about the effects of performance goals on performance outcomes (Rawsthorne & Elliot, 1999).

Empirical Research on the Trichotomous Framework

Experimental and correlational research has given considerable support to the trichotomous model of goal orientation. Also, the research demonstrates various patterns of relationships among the goals and other academic-related constructs. Again, the experimental studies utilized goal manipulation as the treatment variable.

Elliott and Harackiewicz (1996) conducted two experiments on college students to investigate the relationship between achievement goals and intrinsic motivation. In Experiment 1, participants were given four puzzles to solve as the experimental task. Participants were randomly assigned into one of four goal group: mastery, performance approach, performance avoidance, and control. Subjects in the mastery group were told to focus on solving the puzzle, the performance approach group was told to concentrate on demonstrating their ability to solve a puzzle, and the performance avoidance group was asked to focus on not failing to solve the puzzle. The control group was not given a goal for the task.

After completing the puzzle, participants were given a questionnaire to measure their enjoyment of the task (self-report measure of intrinsic motivation), how competent they were at the task, and effort. Students' intrinsic motivation was also rated by the amount of time the participant took playing with extra pieces of puzzle in the experimenter's absence. Results indicated that the performance approach group spent more time playing with extra pieces of puzzles, reported greater enjoyment, and was more involved in the task than the performance avoidance group. The performance avoidance group performed worse than the mastery group in behavioral intrinsic motivation task, enjoyment, and task involvement. The performance approach and mastery goal groups were statistically similar on intrinsic motivation. There were statistical significant differences between performance avoidance and mastery goal groups on all these outcomes.

The second experiment was similar to the first, but performance approach and performance avoidance orientations were manipulated by highlighting success and failure outcomes, respectively. That is, participants in the performance approach group were told that solving more puzzles than other students meant that they had good puzzle solving ability. Participants in the performance avoidance group were told that solving fewer puzzles than other students meant that they had poor puzzle solving ability. The mastery group was given the identical instructions used in Experiment 1. The results replicated the findings in Experiment 1. The positive effects seen in the performance approach group on intrinsic motivation is not surprising because these goals can produce both adaptive and maladaptive patterns of learning (Elliott, 1999; Elliot & Church, 1997; Elliot & McGregor, 1999; Middleton & Midgley, 1997).

Elliott, Shell, Henry, and Maier (2005) conducted an experiment on German high school students to evaluate the effect of goal orientation on performance. Students were given one of three goal conditions: performance approach, performance avoidance, or mastery. Students in the performance approach condition were instructed to demonstrate their ability to solve problems. Students in the performance avoidance conditions were asked to focus on avoiding demonstrating incompetence for problem solving, and those in the mastery group were instructed to focus on learning how to solve problems. All students were informed that they would get feedback after the task was completed.

Students then took the math subset of the German intelligence test. Students in the performance approach and mastery group outperformed students in the performance avoidance group. There were no significant differences in performance between the performance-approach and mastery groups. Results were replicated when the experimenters used the verbal subset of the intelligence test. Again, this finding is not surprising because performance approach goals have been linked to positive performance outcomes before (Pintrich 2000b; Wolters et al., 1996)

In, Baker, McInerney, and Dowson's (2002) study, elementary school students were randomly assigned to one of four goal groups: mastery, performance-approach, performance avoidance, and control. Students in the mastery group were instructed to focus on understanding the task, students in the performance approach group were asked to demonstrate their ability to perform better than others, and students in the performance avoidance group were asked to focus on doing the task so as to not look stupid. The control group did not get a prompt. Students were then given a level of processing task. Questions were phonemic, category, or sentence questions which could be processed

more or less deeply or shallowly. The phonemic questions required shallow processing, whereas the category and sentence questions required deep processing. Students were then asked to freely recall stimulus words from the questions. Also, students were given a cued recall task. Students in the treatment groups outperformed those in the control group on the cued recall task. The performance approach group recalled more category words than students in the control group on the cued recall task. The mastery group recalled fewer phonemic words and more words that required deeper processing than the other groups.

Correlational studies have found varying patterns of relationships among the trichotomous model and other academic constructs. For example, mastery goals have been found to relate to positive outcomes, such as long-term retention of information (Elliot & McGregor, 1999), intrinsic motivation (Elliot & Church, 1997), help seeking (Ryan & Pintrich, 1998), persistence (Pintrich, 2000a), and high performance outcomes (Elliot & Church, 1997).

Performance approach goals have been found to correlate with positive factors such as high performance outcomes (Elliot & Church, 1997), academic self-concept (Pajares et al., 2000; Skaalvik, 1997;), positive affect (Elliott, 1999), task value (Wolters et al., 1996), and intrinsic motivation (Elliot & Church, 1997).

Also, performance approach goals have been linked to negative outcomes such as test anxiety (Elliot & McGregor, 1999; Middleton & Midgley, 1997), low self-efficacy (Skaalvik, 1997), inability to retain information and disruptive behavior (Midgley et al., 2001), and higher avoidant help seeking (Middleton & Midgley, 1997; Ryan & Pintrich, 1998).

Performance avoidance goals have been associated with maladaptive patterns, such as an unwillingness to seek help with schoolwork (Middleton & Midgley, 1997), low self-efficacy, anxiety, and low grades (Urdan et al., 2002), and reduced intrinsic motivation (Elliot & Church, 1997).

Summary

Goal orientation in its most basic form entails cognitive and affective representations that allow us to act, feel, and think in specific ways. In addition, results of the goal orientation studies reported in the literature review suggest that, irrespective of the goal framework, different goal orientations affect achievement-related behaviors in different ways. Mastery goal orientation is generally linked to adaptive patterns of learning and behavior whereas performance avoidance goal orientation is linked to maladaptive patterns of behavior. On the other hand, performance approach goals are linked to both adaptive and maladaptive patterns and have consequently shown inconsistent results about its effects on learning outcomes compared to mastery goals.

Metacognition and Goal Orientation

Goal orientation researchers have shown evidence of a connection between metacognitive awareness and goal orientation, a very critical construct in education. Hacker (1998) defined metacognition simply as *thinking about thinking*. However, other theorists have proposed that not only does metacognition involve thinking about one's one cognitive processes, but it entails understanding and regulating these processes (Schraw, 1998; Schraw & Dennison, 1994). They suggest that metacognitive awareness involves knowledge and regulation of one's own thoughts. Metacognitive knowledge entails how much individuals know about their own way of learning and the strategies

they use to complete tasks. Regulation entails planning, implementing effective learning strategies, monitoring, and evaluating the learning process (Schraw, 1998; Schraw & Dennison, 1994).

Hacker (1998) identified three components of metacognition: metacognitive skill (thinking about what one is doing), metacognitive knowledge (thinking about one's own knowledge), and metacogntive experience (thinking about one's own cognitive and affective experiences). Essentially, metacognition is a component of self-regulation that includes a level of planning, modifying, and changing one's own thinking processes (Corno, 1986; Pintrich & De Groot, 1990).

Theorists have suggested that planning, modifying, and controlling one's own thoughts is crucial in enhancing academic performance and achievement (see, Flavell, 1992; Pintrich & De Groot, 1990; Schraw & Moshman, 1995). However, theorists have proposed that simply possessing metacognitive skills and strategies is not sufficient to enhance academic performance because individuals must also possess a certain level of motivation to engage in metacognition (Bandura, 1993; Pintrich, 1989; Pintrich & De Groot, 1990)

Studies have been conducted to assess the relationship between metacognitive awareness and achievement goal orientation. For instance, Baker et al. (2002) (reviewed in the previous section) found that mastery goal orientation facilitated deeper processing during tasks, a very critical component of meta-cognitive awareness.

McWhaw and Abrami (2001) conducted an experiment to examine the effect of goal orientation and interest on students' meta-cognitive learning strategies. Canadian high school students were asked to identify main ideas from an introductory psychology test,

use cognitive strategies including paraphrasing, underlining or annotating the text, and were asked to complete a meta-cognitive learning strategies questionnaire.

Participants were randomly assigned to one of two conditions: mastery or an extrinsic (performance) goal group. In the mastery group, participants were asked to focus on learning the text, whereas in the extrinsic goal group, students were told that receiving at least a 75% on the task would get them a reward. The extrinsic goal group outperformed the learning goal group in selection of main ideas. There was no effect on metacognition between the two groups. These results suggest that mastery goals were not effective in creating meta-cognitive awareness among students. These results did not replicate other studies. One likely explanation for this finding could be that students did not adopt the goal orientations as directed; the lack of a manipulation check made it impossible to verify the adoptions of these goals.

However, correlational research has shown overwhelming consistent evidence for a strong positive relationship between mastery goals and use of effective metacognitive strategies (see, Ames & Archer, 1988; Elliott et al., 1999; Meece et al., 1988; Middleton & Midgley, 1997; Pintrich & Garcia, 1991; Valle et al., 2003; Wolters et al., 1996;).

On the other hand, regardless of the type of performance goal framework used (approach based and approach-avoidance based performance goals), studies examining the link between performance goals and the use of metacognitive strategies have found a negative link between the two constructs (Ames & Archer, 1988; Anderman & Young, 1994; Elliott et al., 1999; Greene & Miller, 1996; Middleton & Midley, 1997; Nolen, 1988; Nolen & Haladyna, 1990a; Pintrich & Garcia, 1991; Pintrich & De Groot, 1990; Wolters et al., 1996).

It is important to briefly examine the empirical link among goal orientation, metacognition, and learning. It is pertinent for the present study because the connections among goal orientations, metacognition, and learning are examined. Several studies have shown that metacognitive awareness directly and positively affects learning (see Kramarski, 2008; Mevarech & Amrany, 2008; Mevarech & Fridkin, 2006; Mevarech & Kramaski, 1997; Vrugt & Oort, 2008). Other studies have looked at the indirect relationship between goals and learning via metacognition. Vrugt and Oort (2008) looked at the relationship between goals and learning with metacognition as a mediating variable among college students. Mastery goal had a stronger relationship with exam scores - through the mediation of metacognitive strategies and activities - than did performance goals.

In a similar longitudinal study, VandeWalle, Brown, Cron, and Slocum (1999) examined the link between goal orientation and sales performance of medical supplies salespersons. The results revealed that a mastery goal orientation was more strongly related to sales performance through the influence of self-regulated tactics (goal setting, effort, and planning) than a performance goal orientation. The relationship between performance goal orientation and sales performance was statistically insignificant.

Motivation to Read and Learn

It is relevant to note that researchers in the domain of reading have focused attention on motivation in the domain of reading. A brief review of this literature is included because reading is the context from which I investigated the relations among goal orientation, attention, learning, and metacognition. What is the role of achievement

motivation and goal orientation in reading and reading comprehension? Research in reading motivation may provide empirical answers to this question.

Reading scholars have pondered about the role of motivation in reading including goal orientation, intrinsic motivation, and self-efficacy, mostly through the work of Guthrie and his colleagues (Guthrie & Wigfield, 1999). Reading motivation refers to "goals and beliefs with regard to reading" (Guthrie & Wigfield, 1999, p.199) that influence how readers act, interact and learn from the text.

Just as Dweck and Leggett (1988) proposed a link between an individual's implicit theory of intelligence and his/her achievement goals, reading theorists have also provided a link between readers' implicit theories of reading and reading motivation (Schraw & Bruning, 1999). They postulated that readers have an implicit belief system about the reading process. These beliefs affect the way readers approach the reading task and guide the readers' goals, reading strategies, and evaluation of their comprehension and text quality.

Readers may hold transactional or transmission beliefs about reading. Readers with transactional beliefs approach reading as an active and willful process that requires critical thinking and inferences. Individuals with transmission beliefs have superficial beliefs about reading and may not expend much effort for deep understanding of text material. Readers with these different implicit theories may have different motivation to read. A high transactional reader may be more eager and motivated to engage in the reading process than a high transmission reader (Schraw & Bruning, 1999).

Guthrie and Wigfield (1999) proposed a motivational-cognitive model (situation model) of reading to explain how text comprehension takes place. They believed that

both cognitive and motivational processes act in conjunction to aid text comprehension. Pintrich and De Groot (1990) and Pintrich, Marx, and Boyle (1993) also called for inclusion of motivational processes in cognitive models. They argued that individuals do not engage in cognitive activities in the classroom devoid of motivational goals and beliefs; individuals in any task-related academic situation bring into this learning context, choice, a certain level of engagement in the task, and will to persist or not persist at the task, all aspects of the motivational process.

Guthrie and Wigfield's model advocates for "*hot cognition*" in the context of reading. Readers may use motivational processes together with cognitive processes to comprehend information presented in a text. For instance, readers may construct specific goals for a reading, they may want to fully understand text material or may not seek to master text context (see Meece & Miller, 1999), or they may have specific reasons why they want to engage in reading. That is, they may simply enjoy reading (intrinsic motivation) or may read to receive some type of reward (extrinsic motivation) (Guthrie & Wigfield, 1999).

Researchers have tested the model to investigate the relationship between achievement goals and varying aspects of reading and reading comprehension. For instance, Wigfield and Guthrie (1997) examined the effect of motivation on how much children read. One hundred and five fourth and fifth grade students participated in the study. A Motivation for Reading Questionnaire (MRQ) and the Reading Activity Inventory (RAI) were administered during the fall and spring semesters. The RAI was used to measure the breadth and frequency of reading. Also, students' after school reading activities were obtained to measure the amounts of time students spend reading out of school. These data were collected in the fall and spring semesters. One of the

components of the MRQ included intrinsic – extrinsic motivation. The intrinsic motivation component emphasized reading curiosity, which characterizes learning goals, and the extrinsic motivation component emphasized competition and reading for grades, an aspect of performance goals.

Students with higher intrinsic motivation read with more breadth and spent more time reading than students with lower intrinsic motivation. Intrinsic motivation was a stronger predictor of reading amount and breadth. This finding indicates that mastery oriented student paid more attention to text. However, we do not know from this study what effects the extra attention had on text comprehension. The current study explored this relationship.

He (2007) conducted an experimental study to assess the effect of goals on reading strategy and reading comprehension. College students were placed in one of three experimental groups based on their goal profiles and results from a reading proficiency test: strong mastery strong performance, strong mastery weak performance, and weak mastery strong performance. To assess students' strategy use, participants were asked to think aloud while they read and to engage in simulated recall. Comprehension was measured by recording the amount of ideas students had retelling the passage. A reading comprehension test was also administered. Participants in the strong mastery strong performance group used better metacognitive strategies during reading than students in the other two groups. They expended more effort to comprehend the text; they monitored their reading process, reread and paraphrase text information, and used effective strategies to understand difficult information. Also, the strong mastery strong performance group outperformed the other groups on both reading comprehension tasks.

The weak mastery strong performance scored the lowest. These results point to the importance of mastery goals for positive learning outcomes. Do these findings also highlight the importance of the amount of attention the goal groups paid to text information? Was attention a mediating variable? He (2007) did not explore the attention effect; however, the current study examined the link among goals, attention, metacognitive awareness, and text comprehension.

Summary and Critique

Reading researchers and theorists have recently included motivational processes into the reading process. They proposed that readers do not simply engage in the cognitive process of reading, but that readers have motivational beliefs that may affect reading and reading comprehension. Studies have found that reading motivation may positively affect the amount of time readers spend reading, their reading comprehension, and reading strategy use.

These studies examining goal orientations expand our understanding of the relationships between students' goals and learning outcomes. However, they have not explicated a likely reason for a connection between students' reading motivation and comprehension. Is there a causal link between motivation and learning outcomes? Why do some goal orientations prompt students to read longer and deeper and others do not?

Similarly, empirical studies have shown significant relationships between students' goal orientation and metacognitive awareness. However, these studies have not answered the most important question: How do goal orientations increase/decrease what is learned and recalled from text? Is it possible that students' goal orientation can affect comprehension of text via the selective attention model? Can selective attention account

for metacognitive aspects of goal orientations? One line of research called the Selection Attention Strategy (SAS) has used a model that identifies attention as a causal mediating variable between many reading factors and learning. It is pertinent for my purpose to explore this area of research and provide a historical account of reading and the origin of SAS.

Historical Perspective of Reading Research

The roots of education and its practice have always been entrenched in the theories and ideas about learning and learner characteristics derived from the field of psychology (Dole, Duffy, Roehler, & Pearson, 1991). Prominent historical and philosophical psychologists including William James, G. Stanley Hall, and John Dewey shared the common belief that the field of psychology had the obligation to play a very prominent role in the practice of education and schooling (see Berliner, 2006 for a full review). This pattern has been particularly evident in theoretical and empirical work concerning approaches to reading instruction and instructional practices adopted by educators (Berliner, 2006).

In early American psychology, behaviorism was one of the early prominent explanations given for how people learn. Cohen (1987) remarked, "The central tenet of behaviorism is that thoughts, feelings, and intentions, mental processes all, do not determine what we do. Our behavior is the product of our conditioning. We are biological machines and do not consciously act, rather we react to stimuli" (p.71).

The dominance of behaviorists' views was evident within the field of reading and reading comprehension. Dole et al. (1991) stated:

> "It is not surprising then, that reading research and reading comprehension that existed in that period was built from the strong behavioral and task analytic notions about learning that prevailed throughout the early and middle parts of the century. Smith (1965) document show reading was viewed as a skill that could be decomposed into a component set of sub-skills involved in both decoding and comprehension." (p. 40).

In 1908, Huey postulated that reading is a purely cognitive process which is aided by individuals constructing their own meaning. However, the behaviorist view of reading still prevailed – a view that considered the reader as mechanistic and devoid of any cognitive processing. Decades later, Bartlett (1932) tested the schematic-theory approach to reading comprehension. Bartlett found that readers place their own interpretations on text depending on their cultural and factual knowledge. Still, his work was largely ignored in favor of the behavioral approach to reading (Steffensen, Jogdeo, & Anderson, 1978).

It was the contribution of psycholinguist Noam Chomsky that paved the way for an alternative way of conceptualizing learning and language acquisition and consequently how we look at reading. Chomsky (1959) focused on intrinsic linguistic abilities. He postulated that all humans possess a universal grammatical rule for language which is innate in nature. This seminal piece from Chomsky began a cognitive revolution that included varying theories that located the mind as the central and most relevant part of learning.

The theoretical shift undoubtedly led to a shift in education, particularly reading research. Reading researchers began to realize that reading was more complex than what

had been proposed by behaviorist and early reading researchers. They realized that expert reading is not merely mastery of a set of sub-skills that eventually lead to text comprehension or that readers were passive participants of the reading process whose purpose was to derive the true meaning of text information (Anderson, Hiebert, Scott, & Wilkinson, 1984).

The rise of cognitive theory emphasized the interactive nature of reading (see, Anderson & McGaw, 1973; Anderson et al., 1976; Anderson, Reynolds, Schaller, & Goetz, 1977; Bransford, Barclay, & Franks, 1972; Kintsch & van Dijk, 1978). For instance, Bransford et al. (1972) supported a distinction between the "interactive" approach to reading and the "interpretative" approach to reading. They found evidence of interaction during reading. That is, readers tended to add to text information and this extrapolation was usually based on their own knowledge. That is, subjects do not merely regurgitate text information word for word (interpretative approach).

With the rise of the interactive view of reading, reading researchers began to pay closer attention to other critical aspects about reading including the types of information people learn when they read (Hidi, 1995) and the underlying cognitive processes that mediate the known effect of text item importance on learning (R. Reynolds, personal communication, April, 5, 2008). Through extensive research, results demonstrated that readers seemed to learn important information better than unimportant information (e.g., Johnson, 1970; Kaakinen, Hyona, & Keenan, 2002; Kintsch & van Dijk, 1978; Mayer, Cook, & Dyck, 1984; Pichert & Anderson, 1977; Reynolds & Shirey, 1988). A theory of selective attention explains why numerous studies have demonstrated that readers learn more important text information than unimportant information.

Selective Attention Strategy

For decades the major psychological theorists including those who espoused Gestalt psychology, Functionalism, and Behaviorism mostly ignored the role of attention in human functioning (Kahneman, 1973). Moreover, when early theorists explained the notion of attention, their postulation of attention was involuntary attention whereby individuals pay attention because of a surge of spontaneous arousal (Berlyne cited in Kaheman, 1973).

It was not until the rise of cognitive psychology that attention became a prominent topic and relevant for explaining human functioning. Kahneman (1973) conceptualized selective attention as an internal process that could vary in both intensity and amount. According to Kahneman, selective attention is a voluntary process that occurs because an individual is consciously paying attention to stimuli he/she voluntarily undertakes. In this instance, the individual is expending effort during the selective attention process and is not simply being involuntarily aroused.

Kahneman's (1973) work in selective attention sparked extensive research in the area of selective attention and prose learning. It was his perspective on visual tasks and selective attention that were particularly interesting to prose reading researchers. He postulated that when individuals are given a specific visual task, they anticipate that the relevant information from the task is available to them in the written material and this expectation determines the location of their eye fixations or what they selectively pay attention to.

Given Kahneman's (1973) conceptualization of reading and selective attention, prose reading researchers postulated that individuals learn important information more than

unimportant information because they allocate extra attention to the important information (Anderson, 1982; Reynolds & Anderson, 1982; Reynolds et al., 1979). This perspective was originally referred to as the Selective Attention Hypothesis and later renamed the Selective Attention Strategy (SAS) by Reynolds et al. (1989). The SAS is explained by two prose learning theories, schema theory and cognitive processing theory.

Schema theory has its root in Immanuel Kant's philosophy about the acquisition of knowledge (Anderson, Reynolds, Schallert & Goetz, 1977; Rumelhart, 1980). That is, knowledge is not simply acquired through experience; rather, the mind actively operates on incoming information, making the mind a very essential tool for knowledge acquisition (Kant, 1781/1900). Individuals bring to any learning situation a knowledge structure that interacts with the learning situation to help the learner make sense of information presented to them (Anderson & Pearson, 1984; Anderson et al., 1977). Readers' schemata lead to increased attention on text elements that are relevant, thus leading to greater learning (Goetz et al., 1983)

Similarly, Kintsch and van Dijk's (1978) cognitive processing theory explains the SAS. According to the cognitive processing theory, when readers read, they process sentences as propositions. Propositions are stored in a series of cycles, explained by the micro-processing model. That is, propositions enter one's cognitive processes, one sentence at a time during a given processing cycle. Then, a certain number of these propositions are stored in the short term memory. In subsequent processing cycles, the reader compares the new incoming propositions to the propositions already stored in the short term memory to determine if there is overlap among propositions. If there is no

overlap between a new proposition and those already in the short term memory, then the reader searches in his/her long term memory for any overlapping propositions.

Kintsch and Van Dijk proposed that these structures of individual sentences are called micro-propositions. The reader has a set of operators called macro-operators that transform these micro-propositions into a set of macro-propositions so that the reader can get the essence of the reading. They maintained that the reader's knowledge structure or schema determines which micro-propositions are relevant to form the gist of text information. Thus, text comprehension is controlled by a reader's schemata as readers will pay more attention to propositions that are more relevant to their schemata. Moreover, Kintsch and van Dijk claimed that important propositions will remain in working memory longer and thereby undergo more processing cycles than unimportant propositions.

There are three steps involved in the SAS as individuals process and learn text information – first, the reader rates the information for importance while superficially processing the information. Then the reader expends extra attention to information that is deemed more important, and last, given the extra attention or processes supported by the extra attention, more important text segments are better learned (Hidi, 1995; Reynolds, 1992; Reynolds et al., 1989). Reynolds (1992) believed that these steps proceed in order and involve a direct, linear and causal relationship among all the variables.

The SAS has been tested in numerous studies to examine the manipulation of text element salience via text variables, task structure, or readers' characteristics. I will review empirical studies examining salience of text variables first.

Salience Determined by Text Variables

SAS researchers examined text variables by manipulating the density of text information, figurative language of the text, and text structure (Reynolds, 1992). For the sake of space and given text variables are not directly related to the present study, I will briefly review text structure. Manipulating text structure usually included overlapping arguments in the text, integrating propositions, and judging the coherence of the text (Reynolds, 1992).

Cirilo and Foss (1980) manipulated propositions to test the SAS. They presented sets of stories to participants. Some sentences were high in text structure (include many other propositions; sentences that were abstract and formed the settings, themes, etc of the study) in one story and low in text structure (included few other propositions; they were much more concrete and provided specific details of the story) in another story. Text information that was high in text structure was judged more important than information that played a low level role in the story. Results show that readers took a longer time to read sentences when they were high in text structure than when they were low in text structure. Moreover, the high level sentences were learned better. This finding suggests that the SAS was effective in measuring attention and learning.

In a similar experiment, Just and Carpenter (1980) examined eye fixations of participants reading scientific texts. Participants were provided passages from two popular magazines. Passages were divided into sectors that were categorized into text-grammar (e.g., topic, subtopic, definition, setting, cause, and consequence). These grammatical categories made up a hierarchy resulting in five levels with topics and subtopics at the higher levels. Participants' eye-movements were recorded. Participants

fixated longer on sectors that were rated important (e.g., topics, definitions, cause, and consequences) by a pre-study group. Recall for topics, definitions, causes, and consequences were also high.

Britton, Muth, and Glynn (1986) also examined the SAS by manipulating text structure. Results replicated prior studies. Subjects spent more time reading, had slower reaction times on a secondary attention task, and learned the target sentences high in the text structure better.

Although the preceding studies provided strong support for the SAS with salient text structures, a few have provided counter-evidence of a significant connection among important text structure, selective attention and learning (e.g., Britton et al., 1979; Reynolds & Schwartz, 1983).

For instance, Britton et al. (1979) used two experimental texts that contained the same paragraph. In one passage, the target paragraph was highly important and provided useful meaningful information to the passage and in the other passage, the same target paragraph was unimportant to the text. Participants recalled more information from the important target paragraph than information from the unimportant target paragraph. However, attention intensity and duration revealed statistical equivalence for both important and unimportant target paragraphs.

Similarly, Reynolds & Schwartz (1983) found that including metaphors (deemed important text information) in a text helped readers recall the information better. However, readers did not necessarily increase attention on these text elements.

Salience Determined by Task Structure

Research on the salience of task structure and SAS is also extensive. Research on task structure used three types of task variables: pre-reading questions, assigned perspectives, and inserted questions (Goetz et al., 1983; Kaakinen et al., 2003; Lapan & Reynolds, 1994; Reynolds & Anderson, 1982; Reynolds et al., 1979; Rothkopf & Billington, 1979).

Reynolds et al. (1979) investigated the effect of inserted questions on attention and comprehension. Participants were given a 48-page marine biology text to read on a computer with one of three types of questions inserted throughout the text: technical terms, number, proper name, and a no questions condition. Results showed that subjects performed significantly better on the post test that was related to their assigned questions. Moreover, students spent more time reading segments of the text that were important to their questions.

Similarly, Reynolds and Anderson (1982) varied the questions participants received during a reading task to assess the effect of importance on attention and comprehension. Secondary reaction times and reading times were collected. Participants read the same text used in Reynolds et al. (1979) with questions also interspersed throughout the text. Questions always appeared after the segment that had their answers. Readers performed better on segments of the text that their questions made important, they expended more cognitive effort (measured by secondary task reaction time) and spent more time reading the important text information.

In a similar vein, Goetz et al. (1983) investigated the influence of perspectives on participants' attention and learning. Participants were randomly assigned to one of three perspective groups – burglar, homebuyer, and control. Participants were police officers,

students enrolled in a real estate course, and students enrolled in an undergraduate psychology course. Participants were given a passage about two boys playing in one of their homes. Certain segments of the story were important to both a burglar and a homebuyer. Some segments were neutral. Readers spent more time reading elements of the text that were important to their perspectives. Moreover, participants recalled more information important to their perspectives than other unimportant information. Again, the SAS was supported.

Generally, the preceding studies provided strong support for the SAS when task salience was examined. Empirical studies have also examined the SAS with salience determined by reader characteristics.

Salience Determined by Reader Characteristics

Goetz et al. (1983), reviewed in the prior section, also investigated background knowledge and its effect on attention and learning. Specifically, they looked at the readers' background (e.g., police officers, real estate agents, and students) and their effect on attention duration and learning. Police officers spent significantly more time reading burglar sentences and learned these items better than other items in the text. On the other hand, students and real estate agents spent more time reading homebuyer segments but recalled burglar sentences better. The non-significant effect on learning for the homebuyer group may have been due to the limited background knowledge of the students assigned a homebuyer perspective. According to Goetz et al., these students were real estate students enrolled in an introductory community college real estate course and their knowledge about homebuyer items may have been limited at best.

Similar patterns emerged when the influence of readers' interest was examined. In Anderson et al.'s (1984) study, elementary school students were given a passage that was rated for importance in a prior pilot study. Readers paid more attention to interesting information than un-interesting text. They also recalled more interesting information but regression analyses indicated that attention was not the direct cause of increase in learning.

Similarly, Shirey and Reynolds (1988) had undergraduate students read a 72 sentence passage which was previously rated by 37 other undergraduates. Three groups of interestingness resulted from these pre-study ratings – high, low, and no interest. After subjects read a group of 24 of the 72 sentences, they were required to recall what they read. Interest was a significant predictor of recall. That is, sentences that were rated as more interesting were recalled better. However, the data showed that participants did not necessarily pay more attention to the interesting information. SAS was not supported.

Generally, the SAS was strongly supported only when tasks were manipulated (Reynolds, 1992). Results were inconsistent when text variables and reader characteristics were examined. Despite the inconsistent findings of the SAS across studies using different factors of salience, SAS researchers and theorists have made significant progress in expanding the extant literature in selective attention. One critical area points to the relationship between the way the SAS is used and metacognitive strategies.

Metacognition and the SAS

One question the current study seeks to answer is whether the goal groups differ on metacognitive awareness. Thereby, it is useful to review prior research on metacognition

and the SAS. Reynolds et al. (1990) conducted a study using tenth grade good and poor readers. Participants were given a long text to read on the computer. Text segments were divided into proper names and technical terms. Proper names and technical terms short answer questions were inserted throughout the text. Some participants received proper name questions, some technical term questions, and some received no questions. Questions appeared after the relevant information. Secondary reaction and reading times were collected. Participants were interviewed to assess their awareness of the inserted questions and to determine the type of strategy they used during reading. Results indicated that both good and poor readers tended to pay more attention and devoted more effort to information salient to their inserted questions. However, more successful readers realized the objectives of the inserted questions quicker and used the SAS more effectively than poor readers.

Lapan and Reynolds (1994) also conducted a similar study using college students. Students were given reading ability tests to form two groups: low ability and high ability students. All participants were then randomly assigned to either a treatment group (inserted questions) or a control group (no questions). Students read the same text used in Reynolds et al. (1990), but the text was divided into segments which contained information on proper names and neutral information. Participants' reading times were collected.

Participants who received inserted questions performed better on the post test than the control group. High ability students also outperformed low ability students on the post test. Both high and low ability students paid more attention to salient information, although low ability students may have focused more attention given that they read more

slowly. Importantly, more successful readers appeared to use the SAS more efficiently in that they were more metacognitively aware than less successful readers. That is, they concluded more quickly than did low ability students that their inserted questions could be used to identify salient text information.

Relevance Theory

Recently, a new wave of research has emerged in the field of reading and reading comprehension. These contemporary researchers essentially look at the relevance of text information and its impact on attention and learning. Researchers investigating relevance have specifically focused on task-based characteristics and their effect on attention and learning. Their ideas parallel many of the ideas of the SAS. Given that the current study will utilize task based salience, a brief review of the relevance theory is noteworthy.

Consistent with early research in attention, relevance researchers believe that people may learn more relevant information because of the increased effort (SAS) hypotheses. Also, they have postulated that relevance affects attention by increasing reading time (e.g., Kaakinen et al., 2002). They have found that relevance affects learning through the mediation of attention (Kaakinen et al., 2002; Kaakinen et al., 2003; McCrudden et al., 2006; McCrudden et al., 2005). In fact, relevance researchers have not necessarily detached their work in the area from early work in task-based importance and attention and often link this early reading research with work in relevance (see McCrudden & Schraw, 2007; McCrudden et al., 2005).

McCrudden and Schraw (2007) offered a clear distinction between relevance and importance: “relevance is the degree to which a segment is germane to a specific task or goal, whereas importance is the degree to which a segment contains essential information

needed to understand a text" (p. 114). Considering relevance a very critical and relevant component of reading, relevance researchers have concentrated on examining relevance instructions and their effects on learning. Specifically, relevance theorists believe that the relevance of text elements can be enhanced if goal instructions are given to readers (although readers can also generate their own goals for reading). Goals may entail but are not limited to taking a particular perspective, having a purpose, or having questions inserted throughout the text. A relevance effect is created whenever these reading instructions enhance the relevance of a text or text segments (McCrudden & Schraw, 2007).

Graesser, Singer, and Trabasso (1994) believed that inferences made during reading and comprehension of a text parallel the processes underlying the relevance effect. According to Graesser et al., reading starts with goals. When readers establish goals or are provided goals for a reading task, readers will form a deep level meaningful representation of information in the text that reflects their goals. Readers then search for the relevant information during reading and make causal inferences about the information.

Empirical research provides proof of a relevance effect. For instance, Kaakinen et al. (2002) examined the effect of readers' perspective on recall of perspective-relevant information. College students read a text that contained information on four different countries – Andorra, Anguilla, Pitcairn, and Honduras. Students were randomly assigned to two groups. One group was instructed to read from the perspective of a research scientist who has to live in Honduras permanently and who has to decide the good and bad sides of the country. The other group was asked to take the same perspective, but

with Pitcairn instead. The results revealed that readers with the Honduras perspective recalled more information about Honduras than any other information in the text and made more and longer fixations on information about Honduras. Results were replicated for the Pitcairn group.

Similarly, Kaakinen et al. (2003) examined the influence of perspective manipulation, prior knowledge, and working memory span on attention and recall. Participants were given two passages: one passage described familiar diseases (flu, diarrhea, chicken pox, and AIDS) and the other unfamiliar diseases (trigeminusneuralgy, typhus, cystic fibrosis, and scleroderma). Before participants read the passage on familiar diseases, they were told to imagine that they are teachers given the opportunity to teach children about the disease. Half of the participants were then assigned one of two perspectives – half were instructed to teach the children about flu in the passage and the other half was told to teach the children about diarrhea.

Similarly, before participants read the text on unfamiliar diseases, they were asked to imagine that their close friend was diagnosed with either trigeminusneuralgy or typhus and they are to find information about the disease. Half of the participants were given the trigeminusneuralgy perspective and the other half the typhus. Results replicated Kaakinen et al. (2002). Participants fixated longer on text information that was relevant to their perspective. Readers recalled more perspective relevant information than perspective irrelevant information. Again, the SAS was supported for task structure.

Generally, research relevance instructions have consistently shown a positive effect of instruction on learning and attention (see, Lehman & Schraw, 2002; McCrudden &

Schraw, 2007; McCrudden et al. 2006; McCrudden et al., 2005; Seifert, 1993; Wood et al., 1990).

Summary and Critique

In short, the SAS is one explanation for the reason readers learn important information better than unimportant information. Researchers using the SAS framework have manipulated text element salience via text, task, and reader variables.

The SAS has been tested and consistent evidence of the SAS has been demonstrated, especially when task structure determined salience. However, results for reader characteristics and text structure were less consistent. The current study may expand the literature on the effect of task salience (by using goal orientation perspectives) and reader variables (by assessing the effect of students' goals) on learning. Given that task salience has shown consistent evidence of the SAS, this study may also provide empirical evidence of the SAS.

In addition, the SAS studies looking at the meta-cognitive awareness of high and low ability readers are critical for the current study. They provide insight into the relationship between metacognition and attention. It may be that there is a direct positive link between metacognition and attention. The current study explored that possibility by asking participants specific types of questions throughout the text and assessing whether they were aware of the type of question they were assigned.

An alternative way of looking at the SAS has generated new research in the area of selective attention. In recent years, researchers have now started to concentrate on relevance effect and instructions. According to these researchers, relevance rather than importance describes information that is closely linked to readers' goals or to the goals

that someone has given readers. Therefore, they concentrate their research on relevance instruction and its effects on attention and learning. Results have replicated findings from early research in task-based salience and attention and learning. That is, relevance affects attention and learning.

Research into SAS and relevance has broadened our understanding of prose reading and the processes that underlie it. However, SAS may help explain other factors of prose reading that have gone relatively unexplored. For instance, SAS may explain how readers' achievement goal orientations may affect text salience and, in turn, affect metacognitive awareness, attention, and comprehension. Specifically, the SAS may explain the relationships among achievement goal orientations, attention, metacognitive awareness, and learning.

Students' achievement goals are very important traits that may affect other learning outcomes (Ames & Archer, 198; Dweck & Leggett, 1988; Elliott & McGregor, 2001; Wigfield & Guthrie, 1997). However, none of the studies conceptualized a causal mechanism whereby goal orientations may effect changes in achievement outcomes. Could SAS explain how goals may affect learning? Can achievement goal theory fit into selective attention theory?

The Present Study

I investigated how goal orientations may affect learning of text with attention as a mediating variable. I also examined the relationship between goal orientations and metacognitive awareness and studied how awareness may affect the amount of attention students devote to reading salient and non-salient text information. Last, I explored

whether meta-cognitive awareness is a causal mediating variable between goal orientations and learning. Covariates including prior knowledge, interest, reading ability, and personal goal adoptions were included in the analyses to assess their relationships with manipulative goals, metacognition, attention, and comprehension.

I framed my investigations in terms of the SAS and the trichotomous goal orientation framework. Considering that the current study will involve assigning goal perspectives for the reading task, given that goal orientations have significant relationships with academic outcomes (Bereby-Meyer & Kaplan; 2005; Dweck, 1987; Elliott & Dweck, 1988; Elliott & Harackiewicz, 1996; He, 2007; Wigfield & Guthrie, 1997), and given that metacognition is an important variable of both the SAS and goal orientation, the SAS and goal orientation frameworks may be appropriate models to explore the relationships among goal orientation, attention, learning, and metacognition.

Research Questions

Four research questions were examined:

1) Does attention mediate the relationship between goals and learning?

2) Does goal orientation affect metacognition?

3) Does metacognitive awareness affect attention?

4) Does metacognitive awareness mediate the relationship between goals and learning?

Questions 2 and 4 have been investigated by previous research, but the current research is unique in that the SAS framework was used as one mechanism by which to explain these relationships.

Research Hypotheses

Based on findings from the literature, I make several predictions regarding the effects of goal orientation on metacognitive awareness, attention, and learning. The following main hypotheses are proposed.

Hypothesis 1: Goal orientations will affect learning for text when attention is a causal mediating variable. Specifically, mastery goal orientation will have the largest significant effect on attention and comprehension. Attention will be the mediating variable between goals and comprehension.

Hypothesis 2: There will be differences among the goal orientation groups on metacognitive awareness. Specifically, mastery goal orientation will have the largest significant effect on metacognition.

Hypothesis 3: I predict that meta-cognitive awareness will affect attention on salient and non-salient text information. That is, participants as participants become more meta-cognitively aware, they will pay more attention to target information that their questions make salient and vice versa.

Hypothesis 4: Metacognitive awareness will be a causal mediating variable between goal orientations and comprehension.

CHAPTER 3

METHODOLOGY

Participants

One hundred and twenty undergraduate students enrolled in introductory educational psychology courses at a large southwestern university participated in the study. Of the participants, 71.7% was female and 28.3% was male. The mean age of the participants was 24.11 years old (SD = 6.64) with a range of 18 to 47 years. The mean self-reported GPA was 3.23 (SD = .47).

Design

A 4 (Type of Pre-Reading Goal Instruction: mastery, performance approach, performance avoidance, and control) X 3 (Type of Questions: emotions, brain, no questions) X 3 (Type of Text Segment Information: emotion, brain, and neutral) mixed factorial design was used. Type of pre-reading goal instructions and type of questions were between subject factors; type of text segment information was the within-subject factor. That is, all participants read the emotion, brain, and neutral segments (the whole passage). However, students were assigned emotion, brain, or no inserted questions. The dependent measures were attention, comprehension, and metacognitive awareness (when students became aware of assigned inserted questions). Also, covariates were personal goal orientations, prior knowledge concerning cognitive neuroscience, interest in cognitive neuroscience, and reading ability.

Materials

Experimental Text

The experimental text was a 3,440 word passage that described the regions and processes of the brain that regulate different types of emotions. The text was adapted from various public sources including an article entitled *Sad Brain, Happy Brain* published in Newsweek by Miller (2008), an article entitled *The Blushing Brain* published online, from three chapters (8, 9, and 10) from LeDoux (2002)'s *Synaptic Self*, CNS Image Bank: *Depression –Mania* from Lundbeck Institute Online, CNS Forum, Dictionary.com, Knutson, McClellan, and Grafman (2008), Takahashi et al. (2004), and from Harris, Sheth, and Cohen (2008).

The passage was written so it contained three types of information: brain, emotion, and neutral. Seven hundred and twenty words made up the emotion segments, 720 words made up the brain segments, and 2,000 words made up the neutral segments. Each segment presents only the relevant information for that section. For example, the brain segments only contained information that described brain structures and processes that regulate emotions. The emotion segments defined emotions and provided factual information about emotions that did not involve brain regulation. The neutral segments gave the history of cognitive neuroscience, describe research conducted on the brain and emotions, and/or contained transitional sentences.

The segments were presented in paragraphs that contained 40 words each and approximately 2 sentences. There were a total of 86 paragraphs in the entire passage. There were 18 paragraphs each for brain and emotion information and 50 paragraphs of neutral information. Each emotion and brain paragraph was separated by a neutral

paragraph. This was done to ensure that no subject read the same type of information in consecutive segments. The passage was edited so that paragraphs were organized into zones. There were 9 zones. Each zone contained 8 paragraphs with 2 emotion paragraphs, 2 brain paragraphs, and 4 neutral paragraphs per zone. Short-answer questions were inserted after every 8 paragraphs or after a zone for participants who were assigned to question groups. Questions pertained to information read in the preceding zone. Questions were inserted to prompt for subsequent attention on text information that the questions made salient. There were a total of 9 questions embedded within the passage.

There were 4 short-answer questions for each zone on the post test. The questions addressed emotion information or brain information. One question of each type was used as an inserted question and was also used as a posttest question. The remaining 18 questions were used for post test questions only. The text began with 520 words of neutral segments (13 segments of neutral information) before target segments were introduced. The text was modified for presentation on a computer screen in that the text was displayed one segment at a time. To get from one segment to another, participants pressed the down arrow on the computer keyboard. Participants could re-read text segments by pressing the up arrow. The different variations of the experimental texts are presented in Appendix II.

To ensure that each paragraph contained only one type of relevant segment information, two norming studies were conducted using a total of 57 undergraduate students from the same research pool as the current study. The participants were given a condition equivalent to the control in the present study. Two norming studies were

conducted because the results of the first norming study identified problems with the text. That is, text segments did not clearly target the relevant information they were supposed to contain. The first norming study included 34 students, who were asked to rate the entire passage. The second norming study included 23 students (from the same research pool) and they were given only 33 text segments that were not clearly targeting the relevant information in the first norming study. These text segments were rewritten to make segment information more salient.

In both norming procedures, the researcher explained that the passage was divided into three segments and described the nature of each segments. The students were told to indicate whether each segment contains information only relevant to brain, emotion, or neutral and then were instructed to rate the extent to which the segments contain the segment information that they chose. The rating scale ranged from 1 (not at all) to 5(very much so). The scale appeared below each segment. Only the target sentences were analyzed. The 13 segments of neutral information that introduced the passage were not analyzed because they were not relevant to the goals of the study. Readers should note that the second norming group was given a passage that did not flow cohesively from one paragraph to the other. Participants were informed of that fact.

The author and her committee chair agreed that if 60% or more of the participants rated a segment as relevant to its specific type of information, then the segment was deemed appropriate for its particular segment. The results of the norming procedure were as follows: In the first norming study, less than 60% of the participants identified 23 of the 50 neutral segments as neutral segments, less than 60% identified 5 of the 18 emotion segments as containing emotion information, and less than 60% identified 5 of the 18

brain segments as containing brain information. Therefore, these segments were rewritten and normed again.

The mean ratings for the segments that were correctly identified by 60% or more of the participants in the first norming study were as follows: The mean rating of the neutral segments ranged from 3.71 to 4.24; the mean rating of the emotion segments ranged from 3.79 to 4.79; and the mean rating of the brain segments ranged from 3.71 to 4.06. These findings demonstrate that the ratings were on the higher end of the scale and the appropriate segments were considered fairly to highly relevant to their specific information.

Results of the second norming study were as follows. More than 60% of participants rated all re-written segments as appropriate for their specific type of information. The mean rating for the neutral segments ranged from 3.68 to 4.68; the meaning rating of the emotion segments ranged from 3.95 to 4.68; and the mean rating for the brain segments ranged from to 4.00 to 4.57. These results indicate that the participants considered the segments relevant to their specific information.

Pre-reading Goal Instructions

The pre-reading goal instruction prompted participants to adopt specific goal orientations for reading. The pre-reading goal instruction was adapted from Elliott and Harackiewicz (1996) and Elliott et al. (2005). Numerous other studies have successfully manipulated goal orientations (see Bereby-Meyer & Kaplan, 2005; Elliott & Dweck, 1988; Elliott et al., 2005; Grahm & Golan, 1991).

Participants were prompted to adopt one of four goals: a) mastery goal, b) performance approach goal, c) performance avoidance goal, d) control (no goal). The

goal instructions targeted each goal. Only manipulation instructions for the group who did not get inserted questions are provided here. All manipulation instructions are presented in Appendix III. The mastery goal pre-reading instruction was as follows:

> We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of this project is to collect data on college students' reactions to reading a cognitive neuroscience text on a computer. In today's session, you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. At the end of the reading, you will answer some questions on the passage. This session will provide you the opportunity to learn how the brain regulates emotions. When you have completed the study, you will be provided information regarding how well you learned about how the brain regulates emotions. **Remember your goal is to learn how the brain regulates emotions. Please read the passage with your goal in mind.**

The performance approach goal pre-reading instruction was as follows:

> We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of the project is to compare college students to one another in their ability to read text on a computer and successfully answer questions about the text. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. At the end of the reading, you will answer some questions on that passage. In previous work, we have found that most UNLV students are fairly comparable in their ability to read

a text on a computer and successfully answer questions about that text. However, some students stand out because they do quite well on the questions. This session will give you the opportunity to demonstrate that you are exceptional at answering questions about the text you are about to read. When you have completed the study, you will be provided information regarding how well you did compared to the other students. **Remember your goal is to demonstrate that you are exceptional at answering the short answer questions about the passage. Please read the passage with your goal in mind.**

The performance avoidance goal pre-reading instruction was as follows:

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of the project is to compare college students to one another in their ability to read text on a computer and successfully answer questions about the text. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. At the end of the reading, you will answer some questions on that passage. In previous work, we have found that most UNLV students are fairly comparable in their ability to read a text on a computer and successfully answer questions about that text. However, some students stand out because they do quite poorly on the questions. This session will give you the opportunity to demonstrate that you are not extremely poor at answering questions about the text you are about to read. When you have completed the study, you will be provided information on whether you did poorly compared to other students. **Remember your goal is to demonstrate that you**

are not extremely poor at answering the short answer questions about the passage. Please read the passage with your goal in mind.

The control pre-reading instruction was as follows:

> We study reading patterns and the focus of today's session is on how college students read text presented on a computer. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. At the end of the reading, you will answer some questions about the passage. When you have completed the study, you will be provided your score on the test. **Remember your goal is to read a cognitive neuroscience passage on the computer. Please read the passage with your goal in mind.**

Demographic Questionnaire

Students completed a demographic questionnaire to provide information such as age, major, self-reported GPA, etc. Demographic Questionnaire is presented in Appendix IV.

Manipulation Questionnaire

Students were given a manipulation check. They were asked to complete the manipulation check questionnaire to assess whether or not participants read and understood what goal they were asked to adopt. The participants were asked "What was the goal that you were given for this task?," and they responded with one of the following options: "To demonstrate that I am exceptional at answering the short answer questions about the passage," "To demonstrate that I am not extremely poor at answering the short answer questions about the passage," "To learn how the brain regulate emotions," or "To read a passage about the brain and emotions and answer questions about it." In addition,

students were asked whether or not they read the passage with their goal in mind. Frequency counts revealed that 87.1% of participants correctly specified their goal and 92.4% kept their goal in mind while they read. Of the participants who did not correctly identify their goals, 3 were performance approach, 4 were performance avoidance, 3 were mastery, and 5 were control. There were four cases who did not answer the question. In regards to participants who did not keep their goals in mind, 2 were performance approach, 2 were performance avoidance, 2 were mastery, and 2 were control. A multivariate analysis of variance (MANOVA) was conducted to assess whether there were differences between students who did and did not correctly identify their goal and students who did and did not keep their goals in mind on useful variables including learning, reading time, and metacognitive awareness. Results show that there were no differences between groups on any of the measures, *p*s > .05. These findings indicate that the overall results of the study may not have been affected by the students who did not correctly identify their goals and who did not read with their goal in mind. Thereby, the cases were left in the final analyses. The manipulation check questionnaire is presented in Appendix IV.

Personal Goal Orientation

Items were taken from the student version of the Patterns of Adaptive Learning Scales (PALS; Midgley et al., 2000) to assess students' personal mastery, performance-approach and performance-avoidance goal orientations. The student version of the PALS is presented in Appendix IV.

Items on the scale are anchored along a 5-point scale ranging from 1 (not at all true) to 5 (very true). The PALS generates three non-overlapping subscales: mastery goal

orientation (5 items), for example “It’s important to me that I learn a lot of new concepts this year,” performance-approach goal orientation (5 items), for example “One of my goals is to show others that I’m good at my class work,” and performance-avoidance goal orientation (4 items), for example “One of my goals in class is to avoid looking like I have trouble doing the work.” Only category 1 (not at all true of me), category 3 (somewhat true) and category 5 (very true) are anchored along the continuum. Students were asked to select the number corresponding to each statement on the scale that best describes what they think. Responses from each subscale were summed and a single subscale score was generated.

Previous research by Midgley et al. (2000) demonstrated good fit. Confirmatory Factor Analysis (CFA) on the 14 personal goal orientation items confirmed the expected model and showed Goodness of Fit Index (GFI) of .97 and Adjusted Goodness of Fit Index (AGFI) of .95. The mastery, performance-approach, and performance-avoidance goal orientations all loaded on different latent factors. The authors reported reliability alphas for each subscale as follows: mastery goal orientation .85, performance-approach goal orientation, .89, and performance avoidance goal orientation, .74. In the current study, reliability alpha for the mastery subscale was .90, for performance approach, .84, and performance avoidance, .74.

Prior Knowledge

The prior knowledge questionnaire consisted of 4 items that asked subjects to rate how much they know about the brain and how it regulates emotions. Items are anchored along a 7-point Likert-type scale ranging from 1 (nothing) to 7 (a great deal). Responses to the prior knowledge questionnaire were summed to create a single prior knowledge

score. The following are examples of questions on the prior knowledge questionnaire: "How much would you say you know about cognitive neuroscience" and "How familiar are you with cognitive neuroscience?" For the current study, the reliability alpha was .88. The prior knowledge questionnaire is presented in Appendix IV.

Interest

The interest questionnaire consisted of 10 items by which participants rate their interest in the cognitive neuroscience passage using a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) (see Appendix IV). The interest questionnaire was adapted from McCrudden et al. (2005). Responses to the interest questionnaire were summed to create a holistic interest score. Sample items on interest questionnaire include: "I thought this passage was very interesting" and "I would read the passage again if I had the chance". The instrument proved to be reliable with the sample of participants in the study (α =.89).

Reading Ability

Form G of the Nelson-Denny Reading Test (NDRT) was used to assess participants' reading comprehension and reading vocabulary. The NRDT is a standardized test that is divided into 2 subtests and contains 118 items: Comprehension (38 items) and Vocabulary (80 items). The NRDT is a widely used measure by researchers, has a large normative database for comparative purposes, and adequate score reliability and validity are documented in the literature.

Dependent Measures

Attention (Reading Time)

The current study used an excel program developed from Windows Operating Systems (Lawrence, 2008). The program was designed to make precise measurement of participants' reading time. The program clock is accurate to the nearest millisecond. The program includes a look back feature so that participants could re-read segments. Thereby, reading time for the final analyses included the sum of first time and look back reading times. The reliability alpha for reading time was .87.

Metacognitive Awareness

A metacognitive survey was used to assess students' metacognitive awareness and reading strategies. Specifically, participants was asked to provide information on what segment of the text they became aware of the relevance of their questions and whether they changed their reading strategy after that initial awareness. The metacogntive awareness survey is presented in Appendix IV.

Learning

Learning was measured by a short-answer post-test which consisted of 36 items. Eighteen inserted questions made up post-test items. Post test only included questions targeting emotion and brain segments. The short answer test is presented in Appendix V.

Procedure

Random Assignment Procedure

To randomly assign students to the 12 goal and question groups, the online computer software, QuickCalcs (Motulsky, 1984) was used. The online calculator is built so that the number of total subjects, groups, and the number of times to run the randomization procedure are calculated. The software can only handle 4 groups at one time. Therefore, I ran the procedure 3 times, each time with a total of 100 subjects.

Data Collection Procedure

The study was conducted in a computer laboratory during two sessions. Participants completed the study in groups or individually. The most participants per group in one session were about 8 students.

Session 1

At the beginning of session 1, participants were informed of the nature of the study. They were told that the study generally sought to examine how students read text on the computer. Participants then completed the demographic questionnaire, Nelson-Denny reading test, the prior knowledge questionnaire, and the PALS. At the end of session 1, participants were asked to return for session 2, a week later.

Session 2

At the beginning of session two, participants were seated in front of a computer. Participants completed a practice run on how to navigate through a text using the computer software. After the practice session, they were given their pre-reading instruction on a sheet of paper. After students read the manipulation, they were asked to read the passage. After the reading was completed, students completed the manipulation

check questionnaire. Students then completed the interest questionnaire on the computer and participants who were assigned inserted questions were asked to complete the metacognitive awareness questionnaire. Next, they were given the post test. After participants completed all tasks, they were debriefed as to the real purpose of the experiment.

Data Analysis Procedure

Outliers were determined on the measured variables within each treatment group. Skewness and Kurtosis were also examined. According to Kline (1998), normality is reached with skewness and kurtosis absolute values of 3.0 and 8.0, respectively. All skewness and kurtosis values fell within these acceptable ranges indicating that all variables were normally distributed. Two outliers were found and were removed from the database on the specific measured variables.

To examine research questions, analyses were conducted in seven parts: First, I ran repeated measures Analyses of Covariance (ANCOVA) to assess the differences among goal groups on where they focused their attention and what they learned from the passage. These analyses were used to test expected relationships (see Reynolds et al., 1990; Reynolds et al., 1993; Lapan & Reynolds, 1994). Interest, prior knowledge, and reading ability were included as covariates. None of the covariates were significant so they were dropped from the final analyses resulting in repeated measures Analyses of Variance (ANOVA). The homogeneity of variance assumption was tested. Mauchly's test indicated that the assumption of sphericity had been violated, $p < .05$, therefore degrees of freedom were corrected using lower bound estimates of sphericity (epsilon = 0.25 for reading time and .33 for learning), a much more conservative test.

Second, I conducted causal analyses (see Anderson, 1982; Baron & Kenny, 1986; Reynolds et al., 1990 for a more detailed description) to determine whether the goal groups used the SAS differently and to assess whether attention was a causal mediating variable between goals and learning. The data were divided into four goal orientation groups (mastery, performance approach, performance avoidance, and control). Two dependent variables were included in the causal analysis: learning (learning score on each item) and attention (reading time for each text segment). These variables were the first placed in each regression equation. The next variable entered was either a measure of item salience (dichotomously coded: related to participants inserted question type or not) or reading time on the passage (attention).

Traditionally there are four causal hypotheses by which the SAS as a causal model is tested (Anderson, 1982; Baron & Kenny, 1986): 1) salience is positively related to learning, 2) salience is positively related to attention, 3) attention is positively related to learning, and 4) the relationship between salience and learning is significantly reduced when attention is removed (Anderson, 1982; Reynolds et al., 1990). A hierarchical regression approach was used to test these hypotheses (see Anderson, 1982; Anderson, Mason, & Shirey, 1984 for a more detailed explanation of this statistical method). The analysis was conducted sequentially. That is, the subsequent hypothesis was tested only if the preceding one was significant.

Third, I analyzed the reading time data to examine attention patterns among the manipulated goal groups. Readers should note that the interview survey asked participants to indicate when they became aware of their inserted questions. However, participants were not provided the text in hand to give an accurate indication of where in

the text, they became aware. Thereby, responses may not be accurate for the purpose of the metacogntive awareness findings. Thereby, attention patterns were examined instead.

To determine attention patterns the following decisions were made. First, only segment times from Zone 2 onwards were included in the analysis. The patterns of consistency were assessed. A pattern was deemed consistent if participants focused on all segments equally, within a range of 0 – 15 seconds. Such consistency was deemed "not metacognitively aware".

When attention on the next target segment and subsequent ones increased to outside the range of 0 – 15 seconds compared to the non target segments, then the person was assumed to be more aware of their types of inserted questions. However, if the reader had a consistent pattern and then a sudden increase of more than 15 seconds on their next target segments, then revert back to a consistent pattern of less than 15 seconds or equal attention as the non target segments, then that person was assumed to be "not metacognitively aware". It was assumed that the pattern occurred by chance. This analysis was performed only by the current researcher. Thereby, an interrater reliability estimate is not available. Accordingly, caution must be taken when interpreting results from the awareness data.

There were consistent discrepancies between when a majority of participants reported they became aware and their actual attention patterns. That is, students tended to overestimate or underestimate when they became metacognitively aware than what their actual attention patterns showed. As stated earlier, this may have occurred because participants were not given the text when asked to answer the awareness question.

I ran an Analysis of Covariance (ANCOVA) to determine whether goals affect metacognitive awareness. The covariates included interest, reading ability, personal goal adoption, and prior knowledge. Like in the first set of analyses, none of the covariates were significant; therefore, I ran a one way ANOVA. Assumption of homogeneity of variance was tested. The assumption was not met. While I realize that the variances may be different across samples, ANOVA is very robust and works well even when the assumptions is not met, especially considering there were equal numbers of subjects in the different groups (Lindman, 1974)

Fifth, the interview responses were analyzed to examine reading strategy use as strategy use is a critical element of metacognitive awareness. The interview survey asked the following questions: "At what point did you realized what your questions were? "Did you change your reading strategy based on the question that you were given?, and "Explain how you changed your reading strategy?" Chi square was conducted to determine the number of students who reported changing their reading strategies once they became aware of their types of questions.

Sixth, to determine whether metacognitive awareness affect attention on salient and non-salient text segments, a standard regression approach was used. The data were divided into four goal orientation groups (mastery, performance approach, performance avoidance, and control). The data were then further divided into two parts as follows: 1) before awareness and 2) after awareness. Metacognitive awareness was determined from analysis of attention patterns as described previously. Attention (reading time for each text segment) was the dependent variable and item salience was the independent variable.

Last, the effect of goals on learning was examined with metacogntive awareness as a mediating variable using path analysis. The performance goal groups were collapsed into one performance group because ANOVAs revealed that there were no significant differences between these groups on metacognition and learning. The control group was left out of this analysis because they became aware very late in the reading task, towards the end of the reading. Their data may not be useful for the purpose of the current analysis. Consequently, a path model was tested with goals as a dichotomous variable. The reader should also note that this type of analysis was best suited for the data because it would be inappropriate to run separate path analyses for each goal group as there were no variability among groups and the predictor variable is a constant in the model. The final analyses resulted in mastery and non-mastery groups.

CHAPTER 4

FINDINGS OF THE STUDY

The results of the study will be presented in terms of the major outcome variables: learning, attention as measured by reading time, and some analyses involving metacognitive awareness and potential covariates.

Learning

The learning outcome measure was a test containing 36 questions, 18 emotion questions and 18 brain questions. The first analysis involved a repeated measures ANCOVA to test whether or not any of the tested covariates was significantly related to this outcome measure. The covariates tested were: reading ability (Nelson-Denny Reading Test), interest (interest questionnaire), prior knowledge (prior knowledge questionnaire), and goal orientation (PALS; Pattern of Adaptive Learning Scales). The results of this test can be seen in Table 1. In brief, the ANCOVA revealed that none of the covariates reached statistical significance.

A repeated measures ANOVA was therefore conducted on the learning outcome data. There was a main effect for segment type, $F(1, 103) = 21.71$, $p < .01$, $MSE = 1.43$ and goal group, $F(1, 103) = 8.58$, $p < .01$, $MSE = .66$. ANOVA also reached significance for the interactions of Question Type x Segment Type, $F(2, 103) = 107.41$, $p < .01$, $MSE = 7.07$ and Goal Group x Question Type x Segment Type, $F(6, 103) = 2.45$, $p < .05$, $MSE = .16$.

Simple main effects post hoc tests were conducted for the three way interaction. Results reveal that participants in the performance approach goal group with brain question learned target segments (*M* = .59) better than non target segments (*M* = .22). Similarly, subjects in the performance approach emotion question group learned better target segments related to their inserted questions (*M* = .58) than non-salient segments (*M* = .21). For subjects in the performance avoidance group, those in the brain question group learned target segments (*M* = .51) better than segments irrelevant to their inserted questions (*M* = .11). Likewise, performance avoidance students in the emotion question group answered more emotion items correctly (*M* = .54) than non target items (brain) (*M* = .20). Participants in the mastery group with brain questions also performed better on target segments (*M* = .83) than non-target segments (*M* = .18). Also, participants in the mastery group with emotions questions performed better on target segments (*M* = .81) than non-target segments (*M* = .37). Similar patterns appeared in the control goal group. Participant in the brain question group learned target segments (*M* = .35) better than non target segments (*M* = .23) and those in the emotion question group learn target segments (*M* = .64) better than non target segments (*M* = .22).

Simple main effect for target and non target segments by goal and question groups were also analyzed. For the performance approach group, the brain question group (*M* = .59) and the emotion question group (*M* = .58) performed similarly on target segments. Similarly, the brain question group (*M* = .22) and the emotion group (*M* = .21) performed similarly on non target segments. For the performance avoidance group, there was no difference in learning between the brain question group (*M* = .51) and emotion question students (*M* = .54) for target segments. Similarly, there was no difference in learning non

target segments between the performance avoidance brain question group (*M* = .11) and emotion question group (*M* = .20). In regards to the mastery group, students who received brain questions (*M* = .83) and those who received emotion questions (*M* = .81) performed similarly on their target segments. However, the mastery students who got emotion questions (*M* = .37) learned their non target segments better than students who were in the brain question group (*M* = .18). Students in the control goal group with emotion questions (*M* = .64) learned their target segments better than control students in the brain question group (*M* = .35). However, students in the control group with brain question (*M* = .23) performed similarly on non target segments as students in the emotion question group (*M* = .22).

Overall, the findings indicate that participants' performance was much better for salient text information than text information that was not salient to them. It is important for the purpose of the current study to highlight the main effect of goal group. The results reveal that the mastery goal orientation group (*M* = .55) outperformed the performance approach goal orientation group (*M* = .40), the performance avoidance goal orientation group (*M* = .34), and the control goal orientation group (*M* = .36). Results demonstrated that there were no statistical significant differences among the performance goal orientation groups and the control goal orientation group, *p*s > .05. Table 2 presents means and standard deviations of correct target and non target items for goal groups by question groups across segments. Figure 1 shows mean scores for target and non target items for each goal and question groups across segments.

Table 1 ANCOVA Summary for Learning

Source	SS	df	MS	F	p
Interest	.01	1	.01	.20	.66
Mastery	.00	1	.00	.01	.95
Performance Approach	.00	1	.00	.04	.85
Performance Avoidance	.00	1	.00	.04	.84
Prior Knowledge	.00	1	.00	.03	.87
Reading Ability	.20	1	.20	2.95	.09
Error	6.04	91	.07		

Table 2 Mean Learning by Goal Group X Segment Type X Question Type

	Question Type			
	Brain		Emotion	
Segment Type	M	SD	M	SD
	Mastery Goal			
Target	.83*	.15	.81*	.10
Non Target	.18	.12	.37	.13
	Performance Approach			
Target	.59*	.25	.58*	.22
Non Target	.22	.19	.21	.13
	Performance Avoidance			
Target	.51*	.21	.54*	.33
Non Target	.11	.09	.20	.14
	Control			
Target	.35*	.16	.64*	.17
Non Target	.23	.23	.22	.10

Note. * Targeted items. Participants with no questions were not included. Items targeted only brain and emotion segments. Non target segments include either brain or emotion segments.

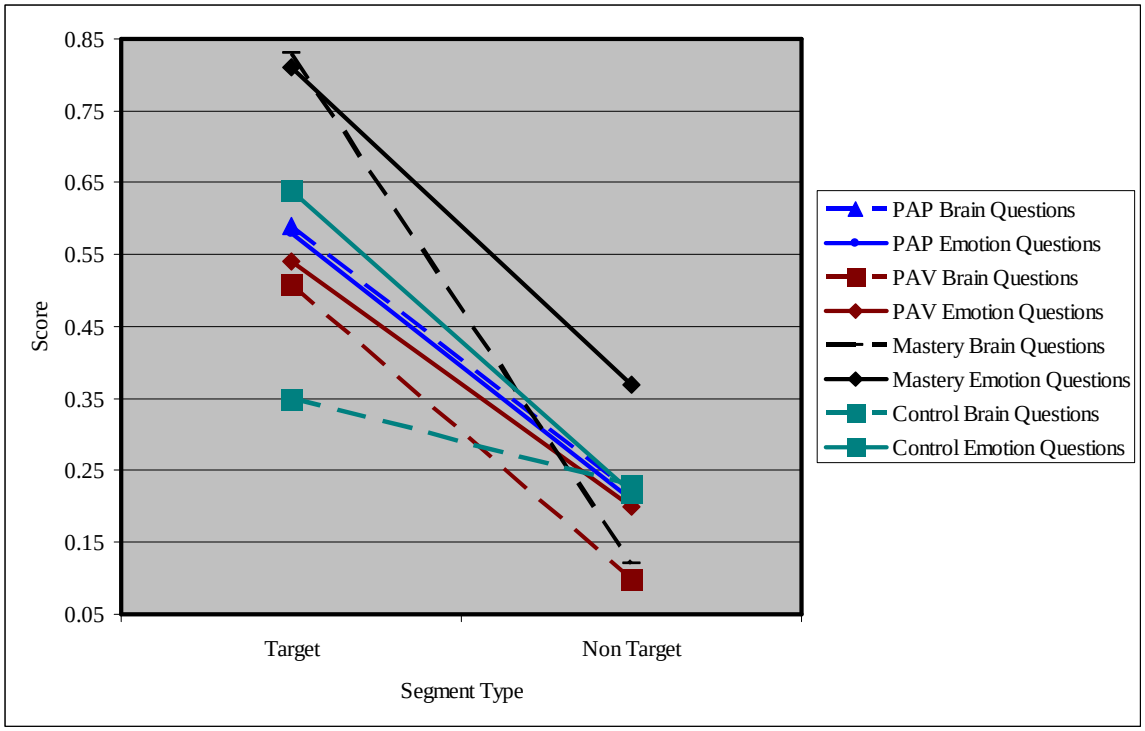

Figure 1. Mean Correct Responses for Target and Non Target Items for Goal Group X Segment Type X Question Type

Attention as Measured by Reading Time

The attention outcome measure was reading time. Reading time was measured to the nearest millisecond using time between bar presses that advanced text at the beginning and at the end points. The first analysis in this section again involved an ANCOVA to test whether or not any of the tested covariates was significantly related to this outcome measure. The covariates tested were: reading ability (Nelson-Denny Reading Test), interest (interest questionnaire), prior knowledge (prior knowledge questionnaire), and goal orientation (PALS; Pattern of Adaptive Learning Scales). The results of this test can be seen in Table 3. Like in the previous learning section, the ANCOVA revealed that none of the covariates reached statistical significance. Given that none of the covariates

yielded significance, a repeated measures ANOVA was therefore conducted on the attention data.

There was a main effect for segment type, $F(1, 107) = 11.86$, $p < .01$, $MSE = 706.16$. ANOVA also yielded significance for the interaction of Question Type x Segment Type, $F(2, 107) = 22.53$, $p < .01$, $MSE = 59.52$. Simple main effects follow up tests reveal that participants who received brain questions inserted throughout the text spent more time reading target segments ($M = 20.18$) than non target segments ($M = 13.21$). Similarly, participants who had emotions inserted questions interspersed in the text read target segments ($M = 17.75$) longer than non target segments ($M = 14.76$). However, simple main effects follow up tests showed that there was no statistical significant difference in reading time for target segments between the brain ($M = 20.18$) and emotion ($M = 17.75$) question groups. Similarly, there was no statistical significant difference in reading time for non target segments between the brain ($M = 13.21$) and emotion ($M = 14.76$) question groups.

It is also relevant to the current study to highlight mean reading time across the goal orientation groups. Although, the main effect for goal group did not reach significance, it is important to point out that the mastery goal orientation group ($M = 17.88$) spent more time reading than the performance approach goal orientation group ($M = 15.78$), the performance avoidance goal orientation group ($M = 15.45$) and the control goal orientation group ($M = 15.31$). Means and standard deviations by question type and segment type are presented in Table 4. Figure 2 shows means by question type and segment type.

Table 3 ANCOVA Summary for Attention

Source	SS	df	MS	F	p
Interest	4.05	1	4.05	.07	.80
Mastery	7.94	1	7.94	.13	.72
Performance Approach	67.50	1	67.50	1.08	.30
Performance Avoidance	23.67	1	23.67	.238	.54
Prior Knowledge	7.78	1	7.78	.13	.72
Reading Ability	150.20	1	150.20	2.41	.12
Error	5913.53	95	62.25		

Table 4 Mean Reading Time by Treatment Type X Segment Type

	Question Type			
	Brain		Emotion	
Segment Type	M	SD	M	SD
Target	20.18*	8.18	17.75	10.25
Non Target	13.21	5.09	14.76*	6.78

Note. * Targeted items. Reading time is expressed in seconds and milliseconds. Non target segments include either brain or emotion segments

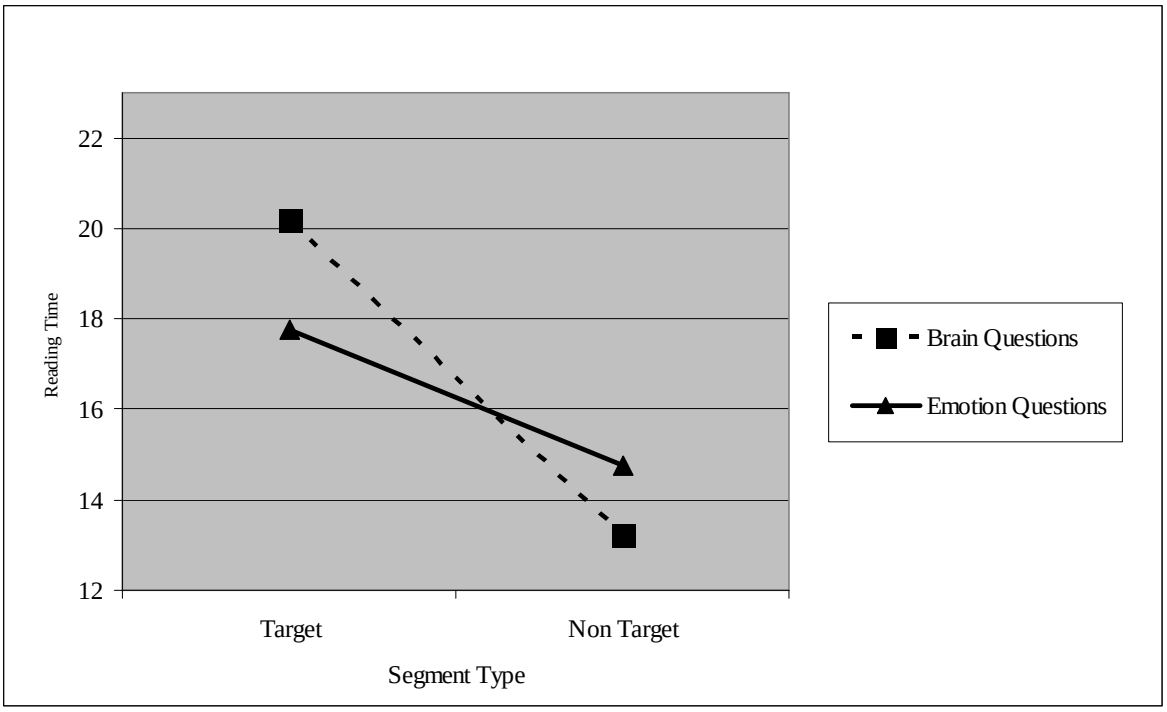

Figure 2. Mean Reading Time by Segment Type X Question Type

Causal Analyses

Recall that Anderson, (1982), Baron and Kenny (1986), and Reynolds and Anderson (1982) described a method by which to test a conceptually driven model of mediating variables to determine whether or not the mediating variable was causally involved in the relationship between an independent variable and an outcome variable. This conceptual test involved the following four hypotheses in the current study.

1. Target information is positively related to learning.
2. Target information is positively related to increased attention.
3. Attention is positively related to learning
4. When the effect of attention is removed, the effect of target information on learning is reduced.

The following analyses all follow the above described logic.

Hypothesis 1

Hypothesis 1 tested whether salience is positively related to learning (Salience → (+) Learning). It was test for the three goal groups and the control group. The regression solution indicated that salience significantly positively predicted learning for all goal groups: mastery goal, $F(1, 1{,}077) = 216.51$, $p < .01$, $\beta = .41$; performance approach goal, $F(1, 1{,}078) = 51.21$, $p < .01$, $\beta = .21$; performance avoidance goal, $F(1, 1{,}039) = 48.76$, $p < .01$, $\beta = .21$; and control, $F(1, 1{,}112) = 38.69$, $p < .01$, $\beta = .18$.

Hypothesis 2

This analysis tested whether salience is positively related to attention (Salience → (+) Attention). It was tested for the three goal groups and the control group. Results indicated that salience significantly positively predicted attention for all goal groups: mastery goal, $F(1, 1{,}077) = 38.11$, $p < .01$, $\beta = .19$; performance approach goal, $F(1, 1{,}078) = 30.74$, $p < .01$, $\beta = .17$; performance avoidance goal, $F(1, 1{,}042) = 17.26$, $p < .01$, $\beta = .13$; and control, $F(1, 1{,}114) = 16.09$, $p < .01$, $\beta = .12$.

Hypothesis 3

This hypothesis tested whether attention is positively related to learning (Attention → (+) Learning). It was tested for the three goal groups and the control group. Results demonstrated that attention significantly positively predicted learning only for the mastery group, $F(1, 1{,}076) = 29.29$, $p < .01$, $\beta = .16$.

Hypothesis 4

For this analysis, the relationship between salience and learning was examined with attention as a causal mediating variable (Salience → (- Attention) --/ → Learning). It was tested for the mastery goal group only. The result demonstrated that the relationship

between learning and salience was reduced (original, $F(1, 1,077) = 216.51$, $p < .01$, $\beta = .41$) when the variance from attention was removed, $F(2, 1,075) = 113.67$, $p < .01$, $\beta = .39$.

Baron and Kenny (1986) proposed a four step approach to mediation between a predictor variable and an outcome variable, much like Anderson's (1982) causal analyses. They conceptualized the following entailments for mediation: 1) predictor (X) to outcome (Y), 2) predictor (X) to mediator (M), 3) mediator (M) to outcome (Y), and 4) predictor (X) to outcome (Y) when the mediator (M) is controlled. These entailments are traditionally tested using a regression approach. Baron and Kenny proposed that if in the final regression the predictor is no longer significant when the mediator is controlled, then there is full mediation. That is, the mediating variable is assumed to fully explain the relationship between the predictor variable and the outcome variable.

However, they believed that if the predictor is still significant in the final regression for the fourth entailment then the mediator can be considered a partial mediator between the predictor and the outcome. That is, the mediating variable may not fully explain the link between the predictor and outcome; another variable (s) may also be responsible for the relationship. These assumptions could be applied to the current study. Given that for the fourth entailment for the mastery group there was still significance between salience and learning when attention was controlled, it appears that attention partially mediated salience and learning. Table 5 presents results for the causal analyses. As mentioned previously, analyses were done sequentially and if an entailment in the analysis was not significant, further analysis was suspended.

Table 5 Tests of the Hypotheses for the Causal Analyses Among Salience, Attention, and Learning

Hypotheses	Beta	Significance Level
	Mastery Goal	
Salience →(+) Learning	.41	$F(1, 1{,}077) = 216.51$, $p < .01$
Salience →(+) Attention	.19	$F(1, 1{,}077) = 38.11$, $p < .01$
Attention →(+) Learning	.16	$F(1, 1{,}076) = 29.29$, $p < .01$
Salience → (- Attention) --/ → Learning	.39	$F(2, 1{,}075) = 113.67$, $p < .01$
	Performance Approach	
Salience →(+) Learning	.21	$F(1, 1{,}078) = 51.21$, $p < .01$
Salience →(+) Attention	.17	$F(1, 1{,}078) = 30.74$, $p < .01$
Attention →(+) Learning	.06	$F(1, 1{,}078) = 3.41$, $p > .05$
	Performance Avoidance	
Salience →(+) Learning	.21	$F(1, 1{,}039) = 48.76$, $p < .01$
Salience →(+) Attention	.13	$F(1, 1{,}042) = 17.26$, $p < .01$
Attention →(+) Learning	.03	$F(1, 1{,}039) = 1.06$, $p > .05$
	Control	
Salience →(+) Learning	.18	$F(1, 1{,}112) = 38.69$, $p < .01$
Salience →(+) Attention	.12	$F(1, 1{,}114) = 16.09$, $p < .01$
Attention →(+) Learning	.05	$F(1, 1{,}112) = 3.13$, $p > .05$

ANCOVA was conducted, but results reveal that none of the covariates reached significance. Therefore, ANOVA was conducted. Table 6 shows these results. There was a significant main effect for goal group on metacognitive awareness, F (3, 74) = 37.99, p < 01, MSE = 3.15. Follow up tests using Bonferroni indicated that on average, the mastery group (M = 2.50; after approximately 3 zones/questions) were aware of the type of inserted questions earlier in the reading than PAP (M = 6.95; after approximately 7 zones/questions), PAV (M = 6.94; after approximately 7 zones/questions), and Control (M = 8.00; after approximately 8 zones/questions). There were no significant differences among the performance and control groups.

Table 6 ANCOVA Summary for Metacognitive Awareness as a Function of Goal Orientation

Source	SS	df	MS	F	p
Interest	.14	1	.14	.05	.83
Mastery	6.16	1	6.16	1.98	.16
Performance Approach	1.16	1	1.16	.37	.54
Performance Avoidance	4.38	1	4.38	1.41	.24
Prior Knowledge	.38	1	.38	.12	.73
Reading Ability	10.81	1	10.81	3.48	.07
Error	198.81	64	3.11		

Metacognitive Awareness and Attention

The same causal regression approach as previously used above was used to determine whether metacognitive awareness affected attention on salient and non-salient information; hence, only Hypothesis 2 was tested. The control group was dropped from the final analysis because they became aware only after zone 8 and their metacognitive awareness data may not be useful. There were significance for all goal groups after awareness: Mastery, After Awareness, $F(1, 715) = 16.28$, $p < .01$, $\beta = .15$; Performance Approach, After Awareness, $F(1, 238) = 4.15$, $p < .05$, $\beta = .14$; and Performance Avoidance, After Awareness, $F(1, 230) = 4.09$, $p < .05$, $\beta = .13$. However, there were no significant effects on attention for goal groups before awareness. The results were as follows: Mastery, Before Awareness, $F(1, 359) = 3.66$, $p > .05$, $\beta = .10$, Performance Approach, Before Awareness, $F(1, 839) = 2.09$, $p > .05$, $\beta = .05$, and Performance Avoidance, Before Awareness, $F(1, 810) = 3.67$, $p > .05$, $\beta = .07$

Interview Responses

The interview survey asked the following questions: “At what point did you realize what your questions were?, “Did you change your reading strategy based on the questions that you were given?, and “Explain how you changed your reading strategy?” As noted earlier, participants mostly over or under exaggerated when they became aware of their inserted questions. Although, participants did not accurately indicate when they became aware, Chi square revealed that once participants became aware of their types of inserted questions, most reported that they changed their reading strategies, $\chi^2(1) = 11.54$, $p = .001$.

In regards to question 3, all participants reported that once they realized their type of inserted questions, they changed their strategy to reading the information concerning their questions more carefully than the other information. For example, participant 1, who was in the mastery group and assigned brain question claimed, “I knew they wanted to know specific parts so I paid more attention to remembering that” and consider participant 20, with emotions questions in the performance approach group, “I focused on what the emotions were instead of the definitions or what parts of the brain they occurred in”. Similarly, participant 63 with a performance avoidance goal with emotion questions responded, “I changed from trying to understand the whole passage thoroughly to trying to remember each emotion statement when it is first introduced”, and participant 90 in the control group with brain questions stated, “I paid more attention to the actual medical names for parts of the brain”. The reader should note that definite conclusions cannot be made about these results because there was only one coder for the interview data and no inter-rater reliability was obtained.

Goal Orientation, Metacognitive Awareness, and Learning

A path model was tested and goals had a significant direct effect on metacognitive awareness ($\beta = -.75$, $p < .0005$). The mastery goal group was aware of their type of inserted questions sooner, after about an average of 3 zones/questions ($M = 2.50$), while the non-mastery group realized their question types after an average of 7 zones/questions ($M = 6.95$). Similarly, the direct effect of metacognitive awareness on learning was also statistically significant ($\beta = -.27$, $p < .05$). That is, as awareness time increased, learning decreased and vice versa. Sobel test for mediation revealed that the indirect effect of

goals on learning through the influence of metacognitive awareness was statistically significant, $p = .03$. This means that metacognition was likely a causal mediating variable between goals and learning.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The study was conducted to examine whether attention mediated the relationship between goals and learning. Specifically, I examined whether individuals with different goal orientations used an approach to selective attention (Selective Attention Strategy) differently. Differences among achievement goals on metacognitive awareness and the indirect effect of goals on learning through the influence of metacognition were also investigated. Reading was used as the context for the study. The study was an experimental study with a 4 (Type of Pre-Reading Goal Instruction: mastery, performance approach, performance avoidance, and control) X 3 (Type of Questions: emotions, neuroscience, no questions) X 3 (type of text segment information: emotion, neuroscience, and neutral) mixed factorial design. Dependent variables included reading time, learning, and metacogntive awareness. Interest, prior knowledge, reading ability, and personal goal adoptions were included as covariates.

Students enrolled in introductory educational psychology courses participated in the study. The study ran in two sessions: In session one, students completed a prior knowledge, personal goal adoption, and demographic questionnaires. Student also took the Nelson Denny Reading test. All measures were reliable instruments. In session two, participants were given goal manipulations instructions and were then asked to read the experimental text on a computer.

The text described the regulation of emotions by certain brain processes. The text was divided into brain, emotion, and neutral segments. Brain segments only included information on what brain processes were involved in emotion, the emotion segment defined emotion terms and did not include brain terms or processes, and the neutral segments did not include definitions of emotion terms or describe brain processes responsible for emotion regulation. The neutral segments mostly information about research and served as transitional sentences.

For some participants, the text had certain target inserted questions depending on the participants' question group. That is, if participants were assigned to the emotion question group, emotion questions were inserted in their text, if they were placed in the brain question group, they had inserted questions interspersed throughout the text, and if they were assigned to the no question condition, then the text had no inserted questions. The text was presented segment by segment and participants were instructed to use the down arrow on their computer key board to get from one segment to another and to use the up arrow to re-read segments. After subject finished reading, an interest questionnaire, goal manipulation check, and post test were completed. Participants who were assigned inserted questions completed an awareness survey.

Four research questions were asked in the current study: 1) Does attention mediate the relationship between achievement goal orientation and student learning?, 2) Does goals affect students' metacognitive awareness?, 3) Does metacognitive awareness affect students' attention on salient and non-salient text elements?, and 4) Does metacognitive awareness mediate the relationship between goals and students' learning?

I hypothesized that attention will mediate the relationship between goals and learning with the mastery goal group using the SAS more effectively. That is, students in the mastery goal group will selectively focus attention on their salient questions and that extra attention will lead to better comprehension. Second, I predict that goal orientation will affect metacognition with students assigned a mastery goal becoming metacognitively aware quicker during the reading process than the other goal groups. Also, I predict that metacognitive awareness will affect attention on salient and non-salient information. Finally, I predict metacognitive awareness will mediate the relationship between goals and learning. Repeated measures ANOVA, ANOVA, causal analyses, analysis of interview responses, and path analysis were conducted to answer research questions.

Conclusions

The current study had interesting and expected findings. First, the findings from the general analyses of the relationships between salience and learning and salience and attention indicated that in spite of their goal orientations, readers focused more on targeted text information than on text elements that were of no salience to them. That is, students in the brain question group paid more attention to brain segments; participants in the emotion question group paid more attention to emotion segments; and students with no questions tended to focus more on neutral segments. Additionally, students in the current study appeared to have learnt target information much better than information that was not salient to them.

These findings are consistent with one theory in the prose reading literature: individuals pay more attention to elements of a text that is salient to them and they learn these much better than non-salient ones (McCrudden & Schraw, 2007; Reynolds & Shirey, 1988). Research show that readers tend to pay more attention to salient information and they learn salient information better than non-salient text despite their individual differences (Goetz et al., 1983; Reynolds et al., 1990), task perspectives and objectives (Kaakinen et al., 2003; McCrudden et al., 2005; Rothkopf & Billington, 1979); or the text structure (Cirilo & Foss, 1980; Johnson, 1970; Kintsch & van Dijk, 1978). It appears that this is also true regardless of readers' goal orientations.

In addition, general analyses revealed that students in the mastery goal group comprehended text information better than students in the other goal groups. This is a replication of findings from several studies in the goal literature. Overwhelmingly, mastery goal orientation is consistently linked to better learning and performance outcomes (Ames, 1992a; Elliot & Church, 1997; Elliot & McGregor, 1999). This suggests that a mastery goal may prompt students to adopt certain cognitive and affective processes that in turn lead to better performance and achievement on any learning tasks (Kaplan & Maehr, 2007).

The first main question raised in the current study pertained to attention potentially mediating the relationship between goals and learning. The findings for analyses of the first two causal hypotheses showed that salience was positively related to learning and salience was positively related to attention across goal groups. These findings replicated findings from the general analyses that were discussed earlier.

However, it appears that the mastery goal group paid more attention and learned the targeted information better than the other goal groups (like in the general analysis). The relationships between salience and attention and salience and learning were stronger (indicated by the beta weights) for the mastery group than the other groups. Again, this suggests that a mastery goal may guide readers to adopt learning strategies that help them focus on information that is relevant and salient to the readers' goals, task, and/or objectives. This in turn, may lead to better comprehension.

Although the general trends were similar across groups, for the third causal hypotheses clear differences emerged. For the mastery goal group, attention was causally related to learning. This seems to indicate that the extra attention students in the mastery goal group paid to salient text information was highly related to reading comprehension. The mastery goal group appeared to have adjusted to salient text information differently than the other goal groups. Their patterns appear to fit Anderson's (1982) causal model.

For the performance and control groups, greater focus on salient information was unrelated to how much they learned from the text. These results seem to support Rothkopf and Billington's (1979) epiphenomenal model of selective attention. In a series of experiments Rothkopf and Billington gave high school students pre reading questions to memorize before reading a passage that was presented on slides.

Attention was measured by reading times per slide or eye movement technology. Just like in the current study, subjects paid more attention to question relevant information than question irrelevant information and learned relevant information better. However, attention did not lead to learning. Rothkopf and Billington concluded that extra attention may have been superficial at best; they suggested that attention was merely an

epiphenomenon of learning and was not necessarily link with it. Other studies have replicated these findings (Lapan & Reynolds, 1994; Reynolds et al., 1990). These studies have demonstrated that the effects of salience on attention and learning vary by reader characteristics. Differences in goal orientation appear to also affect the way readers use selective attention.

The findings for the mastery group may not be surprising when one take into account research in achievement goal orientation. Mastery oriented students tend to persist at task and expend more effort (Elliott et al., 1999; Pintrich & De Groot, 1990); regulate their behaviors better ((Pintrich & De Groot, 1990); and they tend to adopt positive attitudes (Ames & Archer, 1988), more so than students with performance goals. Furthermore, the findings for performance approach goals are inconsistent and specifically in the context of reading, performance approach oriented students tend to adopt poor reading strategies (see He, 2007; Wigfield & Guthrie, 1997). Considering these patterns of learning, students in the mastery group may have adopted other adaptive learning skills, which may have helped influence the attention effect on learning.

It is likely that the mastery group may not have only paid more attention to salient information in order to learn them; they may also have differed from the other goal groups on the type of attention they paid to the text. It could be that the mastery group exerted more cognitive energy and capacity to the passage than other participants. They may have read more intensely, which could have lead to better learning, which may explain the relationship between attention and learning for mastery students (see Reynolds & Shirey, 1988). Research have demonstrated that mastery oriented readers

expend more effort to comprehend text information than those with other goal orientations (Elliott et al., 1999; He, 2007; Wigfield & Guthrie, 1997).

The findings for the fourth causal analyses provide insight into the causal relationships among a mastery goal, attention, and learning and may have supported my first hypothesis. It appears that the relationship between salience and learning was weakened when attention was controlled in the regression equation. That is, the SAS may have been supported for the mastery goal group. In fact, similar findings emerged in Reynolds et al. (1990) for more successful readers. It appears that attention does not seem to fully mediate the relationship between importance and learning. However, attention seems to partially mediate or has the potential of being one cognitive mechanism whereby goals may affect learning. This may suggest that readers with a mastery goal differentiate salient and non-salient text more efficiently than readers with other achievement goals. In addition, attention may be one potential causal factor mediating salience and comprehension for mastery oriented readers. Again this may have supported Anderson's (1982) causal model.

The second question focused on findings documented in the goal orientation literature: can goals affect metacognitive awareness? The present study seems to replicate previous findings and may have supported my second hypothesis; mastery goals positively affect metacognitive awareness and strategies (Ames & Archer, 1988; Baker, McInerney, & Dowson's; 2002; Elliott et al., 1999; He, 2007; Meece et al., 1988; Middleton & Midgley, 1997; Pintrich & Garcia, 1991; Valle et al., 2003; Wolters et al., 1996). The mastery goal group became metacognitively aware earlier in the reading than the other goal groups.

Better metacognitive awareness may help explain why students in the mastery group used the SAS much better than the other goal groups. Reynolds, Wade, Trathen, and Lapan (1989) proposed that in the context of the SAS, metacognitive awareness involves three main phases: task awareness, strategy awareness, and performance awareness. Task awareness pertains to the level of awareness students should possess to point out what text elements are important to completing an assigned task. Strategy awareness involves focusing attention on those text elements that readers have identified as salient. Performance awareness deals with readers' ability to selectively attend to salient information and learning these elements better. Performance awareness pertains to using the SAS effectively enough that results in a causal relationship among salience, attention, and learning.

It appears that all groups had task and strategy awareness. That is, participants were able to identify salient information and pay attention to them. Interview responses provide evidence for strategy awareness. Once, participants were aware of their targeted segments, most reported changing to strategies that focused attention on salient information. However, it appears that students in the mastery group had more effective task and strategy awareness strategies (they realized earlier) and in turn were better able to perform the task and use the SAS much more effectively than students in the other goal groups. They had better performance awareness.

The current study also examined whether metacognitive awareness affect attention on salient and non-salient text information. The findings may have supported my third hypothesis and suggested that the more metacognitively aware readers get, the better they get at differentiating salient and non-salient information. They also become better at

using effective strategies to learn more salient information (from the interview responses). This was true in spite of differences in achievement goal orientations. That is, it may not matter what achievement goal students adopt, metacognitive awareness may very well be a critical tool readers should possess to effectively focus attention behavior on salient text information. However, adopting a mastery goal orientation may predispose a reader to pay attention to salient information earlier in the reading.

The last problem of the present study concerned metacognitive awareness being a mediator between goals and learning. Again the results appear to support my fourth hypothesis. The finding suggests that metacognitive awareness may be a partial mediator between goals and learning. It also suggests that the mastery goal had a stronger positive relationship with learning with metacognition as a partial mediating variable than the other goal groups. Previous research have presented similar findings (VandeWalle, Brown, Cron, & Slocum, 1999; Vrugt & Oort, 2008). It is also important to highlight the results of each path in the path analysis. These results provide further insight into the relationship among goals, learning, and metacognition.

First, the findings replicate results for question two; goals were related to metacognition. Specifically, the mastery goal group was more metacognitively aware earlier than the other goal groups. The second path suggested that metacognitive awareness is positively related to learning. That is, as readers get more metacognitively aware, they increase their chances of fully understanding text information. This finding is not surprising as other studies have shown that metacognitive awareness directly positively affect learning (see Kramarski, 2008; Mevarech & Amrany, 2008; Mevarech & Fridkin, 2006; Mevarech & Kramaski, 1997; Vrugt & Oort, 2008).

Other interesting findings of the current study should be emphasized. First, most participants in the study reported adopting and keeping their assigned goal in mind while reading. In addition, all of the expected relationships demonstrated in previous research were shown in the current study. That is, goals were linked to metacognition and goals were linked to learning. Specifically, students who were assigned a mastery goal orientation outperformed the other groups on the post test and were more metacognitively aware in the beginning of the reading than the other goal groups.

Given these results, it appears that the goal manipulations were effective in focusing orientations on assigned goals like in other empirical studies (see Baker et al., 2002; Elliott & Harackiewicz, 1996; Elliott et al., 2005). This highlights the influence of situation schemas on individuals' own self schemas. As previously discussed, situation schemas are schemas that are tied to specific academic situations, settings, and/or tasks (Kaplan & Maehr, 2007). Nicholls (1984, 1990) proposed that situation schemas (e.g., the task, the classroom setting) can influence individuals' cognitive and affective processes to adopt goal orientations different from those influenced by their own self-schemas. The goal manipulations may have served as situation schemas that influenced students' own self-schemas. It appears that the goal manipulations became prototypes from which individuals' actions, thoughts, and feelings were guided. Essentially, they may have become schemas that drive the achievement goal adoption of each participant in the study. These cognitive frames may have affected the way readers approach the reading task and guide reading strategies, and evaluation of their comprehension and text quality. Moreover, goal priming can activate achievement goals outside of awareness and in turn,

the cognition and behaviors of these goals may also be activated (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001).

Furthermore, goal instructions served as objectives for students on how to proceed with the reading and learning task and inserted questions were used to manipulate task-based salience. Consistent evidence of the SAS has been demonstrated when task structure determined salience. The present study seems to have replicated findings about task based salience and evidence for the SAS (Goetz et al., 1983; Kaakinen, Hyona, & Keenan, 2003; Lapan & Reynolds, 1994; Reynolds & Anderson, 1982)

Finally, the performance approach, performance avoidance, and control goals had similar focusing and learning behaviors across analyses in the current study. Although, a trichotomous goal framework was used in the study (not taken into account the control/no goal), the findings resembled that of the dichotomous framework. That is, the effect of goals on attention, learning, and metacognition presented a partition between mastery and non-mastery/performance goals. Interestingly, the performance avoidance and performance approach goals behaved very much like having no goals in some analyses in the current study.

The current study holds theoretical, instructional, and methodological implications. In regards to theory, there is overwhelming evidence for the effect of goals on learning outcomes. Goal researchers have spent countless research hours explicating the link between goals and learning. Collectively, these studies have linked mastery goal orientation to positive learning outcomes and adaptive patterns of learning (see Ames & Archer, 1988; Bereby-Meyer & Kaplan, 2005; Butler, 1987; Elliott & Dweck, 1988; Elliott & McGregor, 2001; Elliott et al., 1999; Jagacinski & Nicholls, 1987; Newman,

1998; Pintrich & De Groot, 1990a). On the other hand, some of the studies have linked performance approach goals to both adaptive and maladaptive patterns of learning (Ames, 1992a; Ames & Archer, 1988; Anderman et al.,, 1998; Dweck, 1986; Dweck & Leggett, 1988; Jagacinski & Nicholls, 1987; Newman, 1998; Urdan, 1997; Wolters et al., 1996). While all have shown that the performance avoidance goal orientation is maladaptive and can lead to poor performance outcomes (Elliot & Church, 1997; Middleton & Midgley, 1997; Urdan, Ryan, Anderman, & Gheen, 2002).

What we do not know from the myriad of goal studies is why some goals lead to maladaptive patterns of learning and others lead to adaptive learning patterns. The current study may provide insight into one causal mechanism whereby goals can affect learning. It may be that one approach to selective attention, the SAS may help goal theorists understand the underlying relationship between goals and learning. Goal orientations may be better understood if goal orientation theorists, especially in the area of reading explore the possibility of selective attention being a likely causal mediating variable between goals and learning. This may only serve to advance the goal theory.

Second, Reynolds (1992) proposed that motivation may be one reader characteristic that may influence text salience. Findings from my study suggest that motivation may very well affect the way individuals differentiate salient and non-salient information. Although researchers know how individual differences (e.g., age and reading ability) can affect the SAS (Lapan & Reynolds, 1994; Reynolds et al., 1990), they may better understand how other individual differences including goal orientations may affect the way readers use the SAS. Accordingly, the results of the current study may provide a more useful parallel between goals and selective attention.

Findings of the study highlight the importance of paying closer attention to metacognition in the SAS framework. Previous empirical findings have found that varying levels of metacognitive awareness affect how much attention is paid to salient and non salient text information as a function of reading ability and age (Lapan & Reynolds, 1994; Reynolds et al., 1990). Results of the present study may provide a more grounded understanding of the link between metacognition and selective attention strategy when other reader characteristics are considered. Accordingly it may extend theory in the SAS literature.

Moreover, the current study may add to the extant literature on goals and metacogniton. There is empirical evidence that achievement goals influence the adoption of metacognitive skills and strategies (e.g. Ames & Archer, 1988; Elliott et al., 1999; Meece et al., 1988; Middleton & Midgley, 1997; Pintrich & Garcia, 1991; Valle et al., 2003; Wolters et al., 1996).The current study potentially provided further evidence of this phenomenon.

The second implication of my findings concerns pedagogy. Findings of the current study suggest that mastery goal orientation is an important factor in learning, attention, and metacognitive awareness strategies. As a result, strategies that would help students realize the importance of focusing on understanding class material rather than performing better than others or avoiding failure can enhance motivation and use of effective attention and metacogntive strategies (Paris & Paris, 2001). Most importantly, these strategies are critical at the college level to combat the dismal prose literacy rates we see among college students.

It may also be beneficial for students, if teachers are cognizant of adopting mastery goal structures in the classroom to buffer any negative consequences of adopting performance approach and avoidance goals. Research have linked mastery and performance approach classroom goal structures to students' adoption of mastery and performance goals (e.g., Nolen & Haladyna, 1990; Roeser et al., 1996; Urdan & Midgley, 2003). Theorists have suggested that a mastery goal structure will reduce the negative effects of endorsing personal performance-approach goals (Linnenbrink & Pintrich, 2001, Urdan, 2001). Moreover, by understanding that mastery goal orientation is most adaptive for learning and effective metacognitive strategies, educators can implement instructional techniques that may encourage goal orientations that improve adaptive performance patterns and outcomes.

Moreover, students in the control group did not use the SAS as effectively as the other goal groups. In fact, they did worse than the other groups on learning, metacognition, and attention. This accentuates the importance of emphasizing more adaptive goal orientations in the classroom and making these goals very explicit.

In addition, knowing that metacognitive awareness could be linked to learning, teachers should be mindful to implement metacognitive strategy instruction in the classroom. Instructional techniques focused on enhancing metacognitive strategies may result in better comprehension. Teachers could teach students to plan, implement, and assess the type of strategy approaches they adopt for reading or any learning tasks (Good & Brophy, 1995). They could model metacognitive awareness skills in the classroom (Olsen & Singer, 1993), and they could try to implement techniques that focus on

improving the metacognitive knowledge and skills of students (Desoete, Roeyers & De Clercq, 2003).

Given the findings of the current study seem to suggest that attention may potentially be an underlying causal cognitive process whereby goals are linked to learning, it is critical for teachers to emphasize and teach students effective attention strategies. Specifically, teachers should take care to make important concepts salient so that they capture students' attention during the learning process (see Ormrod, 2004).

Furthermore, my findings seem to indicate that when readers are given tasks that points to salient text information, they tend to pay more attention and learn the information better. Thereby, it could be beneficial if teachers clearly state the objectives and goals of the lesson before instruction or provide inserted questions that focus attention on salient and relevant text information. Students may then pay more attention to salient text information relevant to the objectives and they may learn the information better (McCrudden et al., 2005; McCrudden & Schraw, 2006; Schraw, Wade, & Kardash, 1993).

Also, given that some students do not distinguish between salient and non salient information as effectively as others, teachers should encourage students to understand the task and objectives of the task before they engage in reading. They should encourage students to consistently evaluate whether they are meeting the objectives of the task during the reading process (Baker cited in Schraw et al., 1993).

Finally, the importance of providing cues to the salience of text information holds implications for textbook authors. Theorists and researchers have advocated for the use of signals (writing devices such as chapter headings, outlines, abstracts, bolded fonts, etc) to

cue readers of the important parts of the text. This they believe can aid in the comprehension of text material (Lemarie, Lorch, Eyrolle, & Virbel, 2008; Golding & Fowler, 1992**;** Sanchez, Lorch, & Lorch, 2001; Lorch & Lorch, 1995). Moreover, research has shown (e.g., Cirilo & Foss, 1980; Johnson, 1970) that the text structure can affect attention and comprehension. Thereby, authors should highlight sentences/paragraphs of the text that is important for students to learn. For example, sentences that include topic sentences, causal statements, definitions, topics, and subtopics may be important to point out.

The last implication concerns methodology. The current study employed an alternative way of measuring metacognitive awareness: using attention patterns/time. Traditionally, metacognitive awareness is measured using self-report questionnaires and hypothetical interviews (De Corte & Van Pelt, 2003; Elshout-Mohr et al., 2003; Pintrich & De Groot, 1990; Thorpe & Satterly, 1990), think-aloud protocols (Artzt & Armour-Thomas, 1992; Schoenfeld, 1983); observations (e.g., Kinnunen & Vauras, 1995; Pugalee, 2001), and online accounts of metacognitive activities (Kinnunen & Vauras, 1995). These measures have disadvantages (Winne & Perry, 2000). Questionnaires and interviews are self-report and may be very subjective (Desoete & Roeyers, 2006), think alouds may be time consuming (Presley, 2000); observations cannot sufficiently capture intentions of certain behaviors and online entries can only measure a limited set of activities (Desoete & Roeyers, 2006). Reading time may be a more precise and objective measure of metacognitive awareness. Researchers should consider using reading time on text segments or time on specific task to test metacognitive awareness.

Second, although the current study employed the trichotomous goal framework, the dichotomous model of goal orientation was evident for most of the analyses While most research in the goal literature use the trichotomous and the 2 x 2 achievement goal frameworks, researchers should be mindful that in certain learning situations, goals may appear in a dichotomy. Thereby, researchers, especially studies focused on manipulations of achievement goals should consider testing the dichotomous framework of goal orientation.

Third, in this study, the effects of goals on learning, attention, and metacognitive awareness were explored under controlled conditions. The findings may have given us a better understanding of the causal mechanisms through which goals influence learning, attention, and metacognition. It would be beneficial for goal researchers to use controlled conditions with goal manipulations as this may provide better insight into the complexity of achievement goal orientations.

However, the present research is not without limitations. First, it should be noted that the effects of a mastery, performance approach, and performance avoidance were examined. More recent research on goal orientations, on the other hand, has suggested a multiple goal perspective. Students may hold multiple goals simultaneously and they may benefit from adopting both mastery and performance approach goals (e.g., Harackiewicz, Barron, & Elliott, 1998; Harackiewicz, Barron, Carter & Elliott, 2002; Pintrich, 2000b).

Second, students were not given the passage in hand when they were asked to indicate where they believed they became metacogntively aware of their inserted questions. Although reading time and patterns appeared to be an accurate measure of metacognitive awareness, self-report responses could have provided more answers to

other potentially relevant questions about the relationship between goals and metacogntive awareness.

Third, post test items did not target neutral segments. Thereby, there was no information about the way students in the no question condition learn salient and non salient information. A better idea of how all participants distinguish between salient and non salient information and how they learn these information are lacking.

Moreover, a more accurate measure of learning would be delayed comprehension. Empirical research has shown that the mastery goal orientation is linked to better retention (Elliott & McGregor, 1999)., However, delayed learning was not measured and so we could not test whether mastery students learning persisted after the initial reading.

The current study used only one measure of attention: attention duration. A measure of attention intensity was lacking. A more accurate depiction of attention could include the type of attention allocated to text segments. Reynolds et al. (1990) encouraged future researchers to use attention intensity along with duration as one measure may not be adequate.

Recommendations

As a result of these limitations, future studies should use both a measure of attention duration and attention intensity to obtain a more accurate depiction of selective attention. It may provide a broader picture if future researchers collect measures of attention duration and intensity. In addition, future researchers should give students the passage during the interview so that they can physically point out when they became aware of

their types of inserted questions. This could serve as effective triangulation data for reading patterns analysis.

In addition, future researchers could include a delayed learning condition. For example, groups could be divided into the following conditions: mastery immediate, mastery delayed, performance approach immediate, and performance approach delayed, etcetera. In that way, a more accurate depiction of the effect of goals on learning through the mediation of attention will result.

In regards to post test, future researchers could include items targeting neutral segments. This may provide a better understanding of how students in the no question group learn their targeted and non targeted segments.

Future researchers could look at students' goal profiles so that the multiple goal perspective could be examined. Cluster analysis could be conducted to identify groups of students with more than one achievement goal. These profiles could then be linked to attention, learning, and metacognition. Cluster analysis could also be used to place students in the following groups: high mastery low performance, high mastery high performance, low mastery high performance, low mastery low performance, etc (see He, 2007).

Future research could also examine other individual differences and how they impact use of the SAS. For example, future researchers should examine gifted/talented students, other special education populations, ethnicity, gender, other motivational constructs (e.g., self-efficacy, intrinsic and extrinsic motivation, self concept, etcetera). In that light, other disciplines and grade levels should also be explored including science, math, elementary, primary, and high school readers.

APPENDIX I

INFORMED CONSENT FORMS

STUDENT INFORMED CONSENT A

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

STUDENTS ENROLLED IN EDUCATIONAL PSYCHOLOGY COURSES

Department of Educational Psychology

TITLE OF STUDY: The Effect of Goal Orientation on Learning and Attention

INVESTIGATOR(S): Dr. Ralph Reynolds and Ordene V. Edwards

CONTACT PHONE NUMBER: (702) 895-3787

Purpose of the Study

You are invited to participate in a research study. The purpose of this project is to examine how college students read text presented on a computer. The study will be conducted in two phases.

Participants

You are being asked to participate in the study because you are enrolled in an Educational Psychology at UNLV.

Procedures

If you would like to participate, we will ask you for some basic information about yourself (e.g. sex and age), then you will be asked to complete questionnaires about your academic goals and background knowledge. You will also be given a reading ability test. This task should take you about 60 minutes to complete. You will then be required to

return for Phase 2 of the study. You will be given specific instructions to read a text on the computer. You will then be given the text to read. After you complete the reading, you will be required to an interest questionnaire and a short-answer post test on the reading and/or a short survey. This phase of the study should take up approximately 60 minutes of your time resulting in 2 hours for the entire study.

Benefits of Participation

Benefits include an opportunity for you to learn about your reading skills. Having the opportunity to assess these skills may help you identify other strategies that may enhance your skills for future reading assignments.

Risks of Participation

There are risks involved in all research studies. This study may include only minimal risks. A possible risk is anxiety normally associated with completing research studies. You may also experience weariness and boredom, which is normal when completing tasks.

Cost /Compensation

There will not be financial cost to you to participate in this study. The study will take approximately 2 hours of your time over the course of the semester. You will be compensated for your time in the form of research credit if you complete all two components of the study. If you complete only part of the study, you will be partly compensated, commensurate with the amount of phases/times you complete. For example, if you complete only phase 1 of the study, you will receive 1 credit hour rather than 2 credit hours.

Contact Information

If you have any questions or concerns about the study, you may contact Dr. Ralph Reynolds at **702-895-0909.** For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office for the Protection of Research Subjects at 702-895-3787.**

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for at least 3 years after completion of the study. After the storage time the information gathered will be destroyed.

Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18/60 years of age. A copy of this form has been given to me.

_____ _____

Signature of Participant Date

_____

Participant Name (Please Print)

Participant Note: Please do not sign this document if the Approval Stamp is missing or is expired.

STUDENT INFORMED CONSENT B

UNLV UNDERGRADUATE STUDENTS

Department of Educational Psychology

TITLE OF STUDY: The Effect of Goal Orientation on Learning and Attention

INVESTIGATOR(S): Dr. Ralph Reynolds and Ordene V. Edwards

CONTACT PHONE NUMBER: (702) 895-3787

Purpose of the Study

You are invited to participate in a research study. The purpose of this project is to examine how college students read text presented on a computer. The study will be conducted in two phases.

Participants

You are being asked to participate in the study because you are enrolled in an undergraduate class at UNLV.

Procedures

If you would like to participate, we will ask you for some basic information about yourself (e.g. sex and age), then you will be asked to complete questionnaires about your academic goals and background knowledge. You will also be given a reading ability test. This task should take you about 60 minutes to complete. You will then be required to return for Phase 2 of the study. You will be given specific instructions to read a text on the computer. You will then be given the text to read. After you complete the reading, you will be required to take an interest questionnaire and a short-answer post test on the reading and/or a short survey. This phase of the study should take up approximately 60 minutes of your time resulting in 2 hours for the entire study.

Benefits of Participation

Benefits include an opportunity for you to learn about your reading skills. Having the opportunity to assess these skills may help you identify other strategies that may enhance your skills for future reading assignments.

Risks of Participation
There are risks involved in all research studies. This study may include only minimal risks. A possible risk is anxiety normally associated with completing research studies. You may also experience weariness and boredom, which is normal when completing tasks.

Cost /Compensation
There will not be financial cost to you to participate in this study. The study will take approximately 2 hours of your time over the course of the semester. You will be compensated for your time in the form of a raffle for an IPOD if you complete all two components of the study. That is, your name will be entered twice in the raffle for the IPOD. If you complete only part of the study, you will be partly compensated, commensurate with the amount of phases/times you complete. For example, if you complete only phase 1 of the study, name will only be entered once in the raffle for the IPOD.

Contact Information
If you have any questions or concerns about the study, you may contact Dr. Ralph Reynolds at **702-895-3787.** For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office for the Protection of Research Subjects at 702-895-0909.**

Voluntary Participation
Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality
All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for at least 3 years after completion of the study. After the storage time the information gathered will be destroyed.

Participant Consent:
I have read the above information and agree to participate in this study. I am at least 18/60 years of age. A copy of this form has been given to me.

_____ _____
Signature of Participant Date

_____
Participant Name (Please Print)

Participant Note: Please do not sign this document if the Approval Stamp is missing or is expired.

APPENDIX II

EXPERIMENTAL TEXTS

Experimental Text with Emotion Questions Inserted

What cognitive neuroscience is uncovering about the fascinating biology behind our most complex feelings is truly remarkable. As it turns out, love really is blind. Cognitive neuroscience is starting to recognize that the brain is the mind is the brain.

One hundred billion nerve cells, give or take, none of which individually has the capacity to feel or to reason, yet together generating consciousness. This is one of the fascinating aspects of the human body that has captured widespread attention.

For about 400 years, following the ideas of René Descartes, those who thought about its nature considered the mind related to the body, but separate from it. In this model--often called "dualism" or mind-body problem--the mind was "immaterial”

Today neuroscientists are finding abundant evidence of an idea that even Freud played with more than 100 years ago, that separating mind from brain makes no sense. They are beginning to understand brain functions and the connection to the mind.

A noteworthy example of insight into the brain is from nobel Prize-winning psychiatrist-neuroscientist Eric Kandel. He stated directly in a watershed paper published in 1998: "All mental processes, even the most complex psychological processes, derive from operations of the brain."

Neuroscientists consider it settled that the mind arises from cooperation of billions of interconnected cells that, individually, are no smarter than amoebae. But it's a shocking idea that the human mind could arise out of such an array of mindlessness.

Many express amazement that fear, emotional explicit memories, pain, sexual feelings or religious belief could be a product of brain function. They are put off by the notion that such rich experiences could be reduced to mechanical or chemical bits.

Or they worry that scientific explanations may seduce people into moral laziness that provides a ready excuse for any human failing: "My brain made me do it." Our brains indeed are responsible, but that is nonetheless consistent with moral choices.

Writing for the President's Council on Bioethics earlier this year, philosopher Daniel Dennett made the point that building knowledge about the biology of mental life may improve moral decision making. And it could enhance chances of survival as a species.

Your heart, lungs, kidneys and digestive tract keep you alive. But your brain is where you live. The brain is responsible for most of what you care about--language, creativity, imagination, empathy, fear, reasoning, problem solving, understanding, love, and morality.

And it's the repository of all that you feel. The endeavor to discover the biological basis for these complex human experiences gave rise to a relatively new discipline: cognitive neuroscience. Cognitive neuroscientists focus on the biological foundation of mental phenomena.

It recently exploded as a field because of decades of advances in neuroimaging technology that showed the brain at work. As Dr. Joel Yager, professor of psychiatry at the University of Colorado, said, "We can now watch the mind boggle!"

Certainly, you would not find an entry for "mind-boggling" in the index of a modern neuroscience textbook. You will also have a hard time finding the words "happiness" or "sadness" or "anger" or "empathy" or "love" or "fear" or, "faith".

Z1. Cognitive neuroscientists do, however, have a rapidly growing appreciation of the emotional brain and are beginning to look closely at these subjective states, which were formerly the province of philosophers and poets. But, we must ask, what really is emotion?

ES.1. Emotion is the subjective experience that occurs during an emotional state, a usually intense and excited action of some internal feeling. It is the feeling of fear when in danger, or anger when mad, or joy when something good happens.

Researchers, whether in psychology or brain science have typically sought to account for what most people think is emotion. This was clearly their goal when they proposed several theories about the brain and brain processes that are responsible for emotions.

BS.1. They proposed that information received by sensory systems activates emotional-processing brain circuits, evaluate the meaning of stimulus input, and initiate specific emotional responses by triggering output circuits. A given circuit is only activated by stimulus information relevant to its operation.

First, we will take a closer look at fear and how it really works. It is a good, necessary, and relevant place to start, because it is an emotion that neuroscience researchers understand well and have conducted extensive research on.

ES.2. Fear is an unpleasant feeling brought on by the possibility of danger, evil, pain, hopelessness, horror, distress or real or unreal threats, but absolutely necessary to our survival. Fear ranges from mild to extreme - characterized by caution to paranoia.

As we have already mentioned in a previous segment above, many cognitive scientists and even researchers in other fields have researched fear extensively. In fact, these researchers have spent countless hours trying to understand the bases and origin of fear.

BS.2. Two deep brain structures called the amygdala manage the important task of learning and remembering what you should be afraid of. Each amygdala, a cluster of nerve cells, sits under its corresponding temporal lobe on either side of the brain.

Q.1. _____ is the subjective experience that occurs during an emotional state

Z2. The amygdala is practically a household word these days. The Batman comic series *Shadow of the Bat* featured a monster called "Amygdala" and recently a newspaper column called "Kids' City" discussed the role of the amygdala in all childhood fears.

ES.3. Put another way, fear is an emotional state of consciousness or of complete and utter awareness by the individual experiencing that emotional feeling. Essentially, fear is one of the human emotions that we can safely and directly claim monopolizes consciousness.

Much of what have been discovered about the neural bases of fear comes from fear conditioning studies over the past two decades. This procedure hasn't been used much to study the brain until researchers adopted it to study emotional learning.

BS.3. These studies demonstrated that information about the outside world is transmitted to the lateral nucleus from sensory-processing regions in the thalamus and cortex, allowing the amygdala to monitor for danger signs. If danger is detected, the central nucleus is activated.

We will now turn our attention to another type of human emotion that has garnered intense interest from cognitive neuroscientists and other researchers alike - explicit emotional memories. Like fear, cognitive neuroscientists have spent many research hours studying explicit emotional memories.

ES.4. Emotional explicit memories or flashbulb memories are conscious, easily verbalized memories established during emotional situations and are often especially vivid and enduring. Emotional explicit memories are also very complex and involve recall of many different facets of one particular situation.

The classic example is that most baby-boomers know where they were and what they were doing when the news of JFK's assassination broke. Studies by Jim McGaugh and colleagues have implicated brain function in the emotional amplification of explicit memory.

BS.4. In the brain, the amygdala triggers release of hormones from the adrenal gland that return to the brain. Neural activity is activated in the amygdala and the amygdala then

strengthens the consolidation of explicit memories being formed during emotional arousal.

Q.2. Essentially, _____ is one of the human emotions that we can safely and directly claim monopolizes consciousness.

Z3. Studies in recent years led by Larry Cahill and Benno Roozendaal in McGaugh's lab have helped refine how brain function modulates the formation of explicit memories. Their research has focused on specific brain regions and their influence on explicit memories.

ES.5 Emotional explicit memories can also be defined as emotional memories that are most easily retrieved when the individual's emotional state at the time of the formation of the emotional memory matches the individual's emotional state at the time of retrieval**.**

Extensive studies by Robert Sapolsky, Bruce McEwen, Guss Pavlides, David Diamond, Tracy Shors, and Jeansok Kim suggest that stress usually play a role in impairing explicit emotional memories. Their studies have provided a better understanding of stress and emotional memories.

BS.5. During highly stressed conditions, cortisol released from the adrenal cortex rises in the bloodstream. It travels to the brain, binds to hippocampal receptors - which disrupts hippocampal activity and weakens the temporal lobe memory system's ability to form explicit memories.

Let's turn our attention to another emotion – anger. Until recently, there was little research showing how the brain processes anger. But that has begun to change and researchers have been more focused on one of the consequences of anger—aggression.

ES.6. Aggression is an emotional state that can be observed through behavior or which can be expressed internally. It can also be characterized as a feeling of hostility that incites thoughts of attack or violent actions that are hostile and unprovoked.

Researchers have found that there're differences in aggression between men and women and have indicated that men are overtly more aggressive than women. They have concluded that men's and women's brains are different, which may lead to differences in aggression.

BS.6. The orbitofrontal cortex in the front of the brain activates when judgments are made relating to anger. It helps us make decisions and temper emotional responses. Men have a lower volume of gray matter in the orbitofrontal cortex than women.

Q.3. Emotional ____ memories can also be defined as emotional memories that are most easily retrieved when the individual's emotional state at the time of the formation of the emotional memory matches the individual's emotional state at the time of retrieval.

Z4. Adrian Raine and colleagues at the University of Southern California proposed that brain differences account for a healthy portion of the gender gap seen in the frequency of antisocial behavior. They have concluded that the brain is critical in aggression.

ES.7. It's noteworthy to particularly emphasize that aggression can also be defined as an expression of anger that may result from ongoing frustration about a particular situation or situations and can also be considered part of the human gene pool.

In fact, evolutionary theorists have long time been expressing their ideas and beliefs about aggression and evolution. They have argued and presented many fascinating ideas about aggression and how this one emotion has evolved over time within the human race.

BS.7. Anger triggers activity in the brain, specifically part of the brain called the dorsal anterior cingulate cortex (abbreviated dACC). The dACC's is connected to areas of the brain involved in recognizing an offense, registering a feeling, and acting on it.

Cognitive researchers have also expressed a very keen interest in anxiety and consequently they have conducted numerous research studies on it. Many have also particularly focused attention on anxiety disorders, another common human experience. We will briefly define that next.

ES.8. Anxiety disorders are defined as emotions that exist when psychological functioning and interpersonal relationships are disrupted by symptoms such as worry and tension. They are spectrum of conditions that includes generalized anxiety, panic attacks, posttraumatic stress disorder, and obsessive-compulsive disorder.

Researchers have looked at the source of anxiety. For example, Jeffrey Gray believes that anti-anxiety drugs are vital in understanding the nature of generalized anxiety and brain circuits. Let's look at Gray's conception of anxiety at the level of neurons.

BS.8. During threats, serotonin and norepinephrine cells in the brain stem are activated and are released from terminals of these cells. Their main purpose is to enhance synaptic processing of the septum and hippocampus, leading to arousal and vigilance, and anxiety.

Q.4 It's noteworthy to particularly emphasize that aggression can also be defined as an expression of _____ that may result from ongoing frustration about a particular situation or situations and can also be considered part of the human gene pool.

Z5. At its best, Gray's theory lacked key components – components that play critical roles in danger and threats. Although Gray attempted to address these shortcomings, he still didn't present a better model. Before we examine another theory, we'll first define anxiety.

ES.9. Anxiety is essentially defined as an emotional feeling that causes an individual to experience a specific cognitive state of distress, uneasiness, eagerness, tenseness,

uncertainty, agitation, anticipation, or nervousness. In this state, the individuals mind is monopolized by fretful, worrying thoughts.

Many cognitive researchers have dismissed Gray's account of the nature of anxiety. They have presented a more comprehensive working model that includes more prominent components of the brain. We have already discussed the role of one of those critical components.

BS.9. When sensory information about threats are detected by the amygdala, output connections in the brain stem initiate defense responses. Some supporting physiological changes in the body give rise to signals that are returned to the brain and influence ongoing processing.

Cognitive researchers have also investigated sadness and happiness. Depression and mania are core areas of study for them but everyday ups and downs are so broadly defined that these neuroscience researchers have a hard time understanding what exactly to study.

ES.10. Sadness is an emotional feeling that is triggered by conflict, pain, social isolation, attention, body sensations, and decision making. Sadness triggers vary from, the memory of a personal loss; a friend stressing over a work conflict; seeing a desolate film.

Drs. Peter J. Freed and J. John Mann, publishing in The American Journal of Psychiatry, reported on the literature of sadness and the brain on 22 brain studies. Brain scans were on non-depressed but sad volunteers. Sadness was mostly induced.

BS.10. The amygdala and hippocampus are responsible for sadness, as do the prefrontal cortex and the anterior cingulate cortex. A structure called the insula also—it's a small region of cortex beneath the temporal lobes that registers body perceptions and taste.

Q.5. Anxiety is essentially defined as an emotional feeling that causes an individual to experience a specific cognitive _____ of distress, uneasiness, eagerness, tenseness, uncertainty, agitation, anticipation, or nervousness.

Z6. As we have already mentioned, one of the core areas of study for cognitive scientists is depression. Unlike everyday sadness, cognitive neuroscientists have researched depression very extensively and broadly and consequently these researchers have come to understand it fairly well.

ES.11. Depression is a human emotional state characterized by emotional dejection and withdrawal. It is sadness, but it is a unique kind of sadness that is greater and relatively more prolonged than sadness that is usually warranted by some objective reasons.

As research advances, a better understanding about the nature of depression has emerged. In fact, cognitive scientists have found evidence of physiological connections as it relates

to depression. Numerous studies have shown the same connection, which we'll briefly discuss next.

BS.11. Depression causes the adrenal cortex of the brain to secrete more of the stress-related hormone, cortisol. The amygdala and other brain regions alert hypothalamic neurons to release a peptide from the pituitary gland, which releases hormones and in turn, cortisol.

Mania is also one of the core areas of study for neuroscientists. Moreover, mania is one of the many human emotions that have generated numerous scientific studies to determine its nature. Mostly, these neuroscientists have looked at clinical manic disorder.

ES.12. Mania is defined as a mood or emotional disorder that is characterized by euphoric states, excessive activity, constant talkativeness, profuse and rapidly changing ideas, exaggerated sexuality, irritability, gaiety, decreased sleep, impaired judgment, and sometimes psychotic symptoms, such as grandiose delusions.

Numerous research studies have shown that there is definitely a link between physiological functions and mania. Like depression, science and its advanced technological approaches to measure these functions, have awarded us the unique opportunity to understand the nature of mania.

BS.12. In mania, there is an increase in dopamine transmission from the substantia nigra to the neostriatum which is associated with increased sensory stimuli and movement. The transmissions of adrenalin and serotonin from centers of the brain also increase during mania.

Q.6. _____ is a human emotional state characterized by emotional dejection and withdrawal.

Z7. Happiness has also sparked interests. Music or the satisfaction it brings has been used to study happiness. Dr. Mihály Csíkszentmihályi agreed that music may not be a description of happiness, but believed that it coincides with the notion of flow.

ES.13. Happiness or flow is defined as a cognitive emotional state of concentrated attention which humans experience when they engage in certain heightened emotional situations such as listening to music. It certainly mirrors happiness and it is the absence of self-consciousness.

In his book "This Is Your Brain on Music," Dr. Daniel Levitin accounts for the brain regions responsible for music appreciation. He reports on the different regions of the brain that are responsible for the processes involved in music appreciation.

BS.13. The auditory, sensory and motor cortex, and cerebellum help us listen and respond to sounds and rhythms. Music pulls on memories for emotion via the amygdala

and hippocampus. We interpret using the sensory cortex and reason via the prefrontal cortex.

The challenge to scientists becomes greater as they tackle more-complicated emotional states. And the stakes become higher, too, because research into such highly valued and personal mental processes can be easily misunderstood, specifically with emotions including empathy, love, and faith

ES.14. Empathy is more than being nice. It is the ability to feel what another person feels, and in its most refined form it is the capacity to deeply understand another person's view point. It involves attributing one's feeling to another.

Simon Baron-Cohen, a leading researcher in the study of autism, has conducted extensive research about the neural bases of empathy. He has coined the term "mindblindness" to describe various problems with empathy. He has identified brain structures responsible for empathy.

BS.14. At the junction of the temporal and parietal lobes, the brain handles memory for events, moral judgment and biological motion (what we might call body language). And the prefrontal cortex handles many complex reasoning functions involved in feelings of empathy.

Q. 7. _____ or flow is defined as a cognitive emotional state of concentrated attention which humans experience when they engage in certain heightened emotional situations such as listening to music.

Z8. Not surprisingly, many cognitive researchers have also paid a lot of attention and conducted extensive research on love. Certainly, it is one of the many complex human emotions that cognitive neuroscientist have attempted to link to physiological functions and processes.

ES.15. Love is a feeling of warm personal attachment to or deep affection for someone. It's characterized by how much you care about another person including a parent, child, lover, or friend. It can also mean strong enthusiasm for anything.

Pair-bonding in animals, particularly a small rodent called the prairie vole, has provided researchers a way of studying something akin to love. However, researchers have not only studied attachment behaviors, they've also studied neural bases of particular feelings of love. Circle the information the above paragraph contain.

BS.15. Parts of the brain - the insula, anterior cingulate, hippocampus and nucleus accumbens regulate body and emotional perception, memory and reward. There is also an increase in neurotransmitter activity along brain circuits governing attachment and bonding, as well as reward.

Numerous empirical research studies have also focused on understanding another human emotional state - faith. Like empathy and love, cognitive neuroscientists have faced immense difficulties and setbacks seeking to effectively understand the physiological bases of faith as it is complex.

ES.16. Faith is characterized by an act of utter confidence or trust in a person or thing. It is essentially a confident belief reaction to information, a situation, or an event that is not based on logical proof or material evidence.

The Annals of Neurology published an article by Sam Harris and colleagues exploring what happen in the brain when people exercise faith. They used functional magnetic resonance imaging (Fmri) to explore the links between physiological functioning and individuals' belief systems.

BS.16. The results indicated that when individuals exercise faith signals in the Ventromedial Prefontal Cortex (VMPC) increases. This increase in signal was particularly prominent in the region of the gyrus rectus and the orbitomedial gyrus, specifically in the left brain hemisphere.

Q. 8. _____ is a feeling of warm personal attachment to or deep affection for someone

Z9. Moral philosophers have long made the distinction between guilt and shame. Recently, cognitive neuroscientists have also started looking at these particular distinctions in relation to the neural functions. We will explore both types of human emotions, beginning with shame first.

ES.17. Shame is the awareness that one's behavior is an object of laughter and spite from others. That awareness is a very painful emotion arising from the consciousness of something dishonorable, improper, and ridiculous, done by oneself or even another individual.

Shame has also been scientifically linked to physiological functioning. Neuroscientists such as Kristin Knutson, Erin McClellan, and Jordan Grafman have conducted a functional Magnetic Resonance Imaging study to show the link between brain and shame. Their results are presented next.

BS.17. The inferior parietal lobe in the brain is activated when individuals observe any offensive shameful social gesture, such as a fascist salute. The shame they experience trigger increased activation in the parietal lobe – a part of the mirror neuron system.

As we have already mentioned earlier, guilt, like shame has also generated extensive interest from cognitive neuroscientists, recently. They have attempted to explain the nature of guilt and its neural bases. We will explore the human emotion of guilt next.

ES.18. Unlike shame, guilt is the awareness of doing something intrinsically wrong, even without witnesses. It's a feeling of responsibility or remorse for some offense, crime,

and/or wrong whether real or imagined. This offense is usually against moral or penal law.

Cognitive neuroscientists including Hidehiko Takahashi, Noriaki Yahata, Michihiko Koeda, Tetsuya Matsuda, Kunihiko Asai, and Yoshiro Okubo have used functional Magnetic Resonance Imaging studies to examine the neural connections between the brain and guilt. We will report one such study next.

BS.18. There are increased activations in different parts of the brain including the medial prefrontal cortex (MPFC), left posterior superior temporal sulcus (STS), and the visual cortex when people experience guilt. These lights up when participants read passages containing guilty sentences.

Given that so much of who we are is defined by our emotions, it's important that we uncover as much as we can about the brain mechanisms of many emotions. This task is just beginning, but the future is bright.

Q. 9. _____ is the awareness that one's behavior is an object of laughter and spite from others.

Note. BS= Brain Segment; ES= Emotion Segment; Z = Zone; Q = Question. The text read by participants did not include bolded NS, ES, Z, and Q. They are included in the appendix to assist readers of this paper in correctly identifying emotion segments, brain segments, zones, and questions within the text.

Experimental Text with Brain Questions Inserted

What cognitive neuroscience is uncovering about the fascinating biology behind our most complex feelings is truly remarkable. As it turns out, love really is blind. Cognitive neuroscience is starting to recognize that the brain is the mind is the brain.

One hundred billion nerve cells, give or take, none of which individually has the capacity to feel or to reason, yet together generating consciousness. This is one of the fascinating aspects of the human body that has captured widespread attention.

For about 400 years, following the ideas of René Descartes, those who thought about its nature considered the mind related to the body, but separate from it. In this model--often called "dualism" or mind-body problem--the mind was "immaterial”

Today neuroscientists are finding abundant evidence of an idea that even Freud played with more than 100 years ago, that separating mind from brain makes no sense. They are beginning to understand brain functions and the connection to the mind.

A noteworthy example of insight into the brain is from nobel Prize-winning psychiatrist-neuroscientist Eric Kandel. He stated directly in a watershed paper published in 1998: "All mental processes, even the most complex psychological processes, derive from operations of the brain."

Neuroscientists consider it settled that the mind arises from cooperation of billions of interconnected cells that, individually, are no smarter than amoebae. But it's a shocking idea that the human mind could arise out of such an array of mindlessness.

Many express amazement that fear, emotional explicit memories, pain, sexual feelings or religious belief could be a product of brain function. They are put off by the notion that such rich experiences could be reduced to mechanical or chemical bits.

Or they worry that scientific explanations may seduce people into moral laziness that provides a ready excuse for any human failing: "My brain made me do it." Our brains indeed are responsible, but that is nonetheless consistent with moral choices.

Writing for the President's Council on Bioethics earlier this year, philosopher Daniel Dennett made the point that building knowledge about the biology of mental life may improve moral decision making. And it could enhance chances of survival as a species.

Your heart, lungs, kidneys and digestive tract keep you alive. But your brain is where you live. The brain is responsible for most of what you care about--language, creativity, imagination, empathy, fear, reasoning, problem solving, understanding, love, and morality.

And it’s the repository of all that you feel. The endeavor to discover the biological basis for these complex human experiences gave rise to a relatively new discipline: cognitive

neuroscience. Cognitive neuroscientists focus on the biological foundation of mental phenomena.

It recently exploded as a field because of decades of advances in neuroimaging technology that showed the brain at work. As Dr. Joel Yager, professor of psychiatry at the University of Colorado, said, "We can now watch the mind boggle!"

Certainly, you would not find an entry for "mind-boggling" in the index of a modern neuroscience textbook. You will also have a hard time finding the words "happiness" or "sadness" or "anger" or “empathy” or "love" or “fear” or, “faith”.

Z1. Cognitive neuroscientists do, however, have a rapidly growing appreciation of the emotional brain and are beginning to look closely at these subjective states, which were formerly the province of philosophers and poets. But, we must ask, what really is emotion?

ES.1. Emotion is the subjective experience that occurs during an emotional state, a usually intense and excited action of some internal feeling. It is the feeling of fear when in danger, or anger when mad, or joy when something good happens.

Researchers, whether in psychology or brain science have typically sought to account for what most people think is emotion. This was clearly their goal when they proposed several theories about the brain and brain processes that are responsible for emotions.

BS.1. They proposed that information received by sensory systems activates emotional-processing brain circuits, evaluate the meaning of stimulus input, and initiate specific emotional responses by triggering output circuits. A given circuit is only activated by stimulus information relevant to its operation.

First, we will take a closer look at fear and how it really works. It is a good, necessary, and relevant place to start, because it is an emotion that neuroscience researchers understand well and have conducted extensive research on.

ES.2. Fear is an unpleasant feeling brought on by the possibility of danger, evil, pain, hopelessness, horror, distress or real or unreal threats, but absolutely necessary to our survival. Fear ranges from mild to extreme - characterized by caution to paranoia.

As we have already mentioned in a previous segment above, many cognitive scientists and even researchers in other fields have researched fear extensively. In fact, these researchers have spent countless hours trying to understand the bases and origin of fear.

BS.2. Two deep brain structures called the amygdala manage the important task of learning and remembering what you should be afraid of. Each amygdala, a cluster of nerve cells, sits under its corresponding temporal lobe on either side of the brain.

Q.1. They proposed that information received by sensory systems activates emotional-processing _____ circuits, evaluate the meaning of stimulus input, and initiate specific emotional responses by triggering output circuits.

Z2. The amygdala is practically a household word these days. The Batman comic series *Shadow of the Bat* featured a monster called "Amygdala" and recently a newspaper column called "Kids' City" discussed the role of the amygdala in all childhood fears.

ES.3. Put another way; fear is an emotional state of consciousness or of complete and utter awareness by the individual experiencing that emotional feeling. Essentially, fear is one of the human emotions that we can safely and directly claim monopolizes consciousness.

Much of what have been discovered about the neural bases of fear comes from fear conditioning studies over the past two decades. This procedure hasn't been used much to study the brain until researchers adopted it to study emotional learning.

BS.3. These studies demonstrated that information about the outside world is transmitted to the lateral nucleus from sensory-processing regions in the thalamus and cortex, allowing the amygdala to monitor for danger signs. If danger is detected, the central nucleus is activated.

We will now turn our attention to another type of human emotion that has garnered intense interest from cognitive neuroscientists and other researchers alike- explicit emotional memories. Like fear, cognitive neuroscientists have spent many research hours studying explicit emotional memories.

ES.4. Emotional explicit memories or flashbulb memories are conscious, easily verbalized memories established during emotional situations and are often especially vivid and enduring. Emotional explicit memories are also very complex and involve recall of many different facets of one particular situation.

The classic example is that most baby-boomers know where they were and what they were doing when the news of JFK's assassination broke. Studies by Jim McGaugh and colleagues have implicated brain function in the emotional amplification of explicit memory.

BS.4. In the brain, the amygdala triggers release of hormones from the adrenal gland that return to the brain. Neural activity is activated in the amygdala and the amygdala then strengthens the consolidation of explicit memories being formed during emotional arousal.

Q.2. These studies demonstrated that information about the outside world is transmitted to the lateral _____ from sensory-processing regions in the thalamus and cortex, allowing the amygdala to monitor for danger signs.

Z3. Studies in recent years led by Larry Cahill and Benno Roozendaal in McGaugh's lab have helped refine how brain function modulates the formation of explicit memories. Their research has focused on specific brain regions and their influence on explicit memories.

ES.5 Emotional explicit memories can also be defined as emotional memories that are most easily retrieved when the individual's emotional state at the time of the formation of the emotional memory matches the individual's emotional state at the time of retrieval**.**

Extensive studies by Robert Sapolsky, Bruce McEwen, Guss Pavlides, David Diamond, Tracy Shors, and Jeansok Kim suggest that stress usually play a role in impairing explicit emotional memories. Their studies have provided a better understanding of stress and emotional memories.

BS.5. During highly stressed conditions, cortisol released from the adrenal cortex rises in the bloodstream. It travels to the brain, binds to hippocampal receptors - which disrupts hippocampal activity and weakens the temporal lobe memory system's ability to form explicit memories.

Let's turn our attention to another emotion – anger. Until recently, there was little research showing how the brain processes anger. But that has begun to change and researchers have been more focused on one of the consequences of anger—aggression.

ES.6. Aggression is an emotional state that can be observed through behavior or which can be expressed internally. It can also be characterized as a feeling of hostility that incites thoughts of attack or violent actions that are hostile and unprovoked.

Researchers have found that there're differences in aggression between men and women and have indicated that men are overtly more aggressive than women. They have concluded that men's and women's brains are different, which may lead to differences in aggression.

BS.6. The orbitofrontal cortex in the front of the brain activates when judgments are made relating to anger. It helps us make decisions and temper emotional responses. Men have a lower volume of gray matter in the orbitofrontal cortex than women.

Q.3. During highly stressed conditions, cortisol released from the adrenal _____ rises in the bloodstream.

Z4. Adrian Raine and colleagues at the University of Southern California proposed that brain differences account for a healthy portion of the gender gap seen in the frequency of antisocial behavior. They have concluded that the brain is critical in aggression.

ES.7. It's noteworthy to particularly emphasize that aggression can also be defined as an expression of anger that may result from ongoing frustration about a particular situation or situations and can also be considered part of the human gene pool.

In fact, evolutionary theorists have long time been expressing their ideas and beliefs about aggression and evolution. They have argued and presented many fascinating ideas about aggression and how this one emotion has evolved over time within the human race.

BS.7. Anger triggers activity in the brain, specifically part of the brain called the dorsal anterior cingulate cortex (abbreviated dACC). The dACC's is connected to areas of the brain involved in recognizing an offense, registering a feeling, and acting on it.

Cognitive researchers have also expressed a very keen interest in anxiety and consequently they have conducted numerous research studies on it. Many have also particularly focused attention on anxiety disorders, another common human experience. We will briefly define that next.

ES.8. Anxiety disorders are defined as emotions that exist when psychological functioning and interpersonal relationships are disrupted by symptoms such as worry and tension. They are spectrum of conditions that includes generalized anxiety, panic attacks, posttraumatic stress disorder, and obsessive-compulsive disorder.

Researchers have looked at the source of anxiety. For example, Jeffrey Gray believes that anti-anxiety drugs are vital in understanding the nature of generalized anxiety and brain circuits. Let's look at Gray's conception of anxiety at the level of neurons.

BS.8. During threats, serotonin and norepinephrine cells in the brain stem are activated and are released from terminals of these cells. Their main purpose is to enhance synaptic processing of the septum and hippocampus, leading to arousal and vigilance, and anxiety.

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Z5. At its best, Gray's theory lacked key components – components that play critical roles in danger and threats. Although Gray attempted to address these shortcomings, he still didn't present a better model. Before we examine another theory, we'll first define anxiety.

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Cognitive researchers have also investigated sadness and happiness. Depression and mania are core areas of study for them but everyday ups and downs are so broadly defined that these neuroscience researchers have a hard time understanding what exactly to study.

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Drs. Peter J. Freed and J. John Mann, publishing in The American Journal of Psychiatry, reported on the literature of sadness and the brain on 22 brain studies. Brain scans were on non-depressed but sad volunteers. Sadness was mostly induced.

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Q.5. When sensory information about threats are detected by the amygdala, output connections in the brain ____ initiate defense responses.

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ES.11. Depression is a human emotional state characterized by emotional dejection and withdrawal. It is sadness, but it is a unique kind of sadness that is greater and relatively more prolonged than sadness that is usually warranted by some objective reasons.

As research advances, a better understanding about the nature of depression has emerged. In fact, cognitive scientists have found evidence of physiological connections as it relates to depression. Numerous studies have shown the same connection, which we'll briefly discuss next.

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The challenge to scientists becomes greater as they tackle more-complicated emotional states. And the stakes become higher, too, because research into such highly valued and personal mental processes can be easily misunderstood, specifically with emotions including empathy, love, and faith

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Simon Baron-Cohen, a leading researcher in the study of autism, has conducted extensive research about the neural bases of empathy. He has coined the term "mindblindness" to describe various problems with empathy. He has identified brain structures responsible for empathy.

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Z9. Moral philosophers have long made the distinction between guilt and shame. Recently, cognitive neuroscientists have also started looking at these particular distinctions in relation to the neural functions. We will explore both types of human emotions, beginning with shame first.

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Shame has also been scientifically linked to physiological functioning. Neuroscientists such as Kristin Knutson, Erin McClellan, and Jordan Grafman have conducted a functional Magnetic Resonance Imaging study to show the link between brain and shame. Their results are presented next.

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As we have already mentioned earlier, guilt, like shame has also generated extensive interest from cognitive neuroscientists, recently. They have attempted to explain the nature of guilt and its neural bases. We will explore the human emotion of guilt next.

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Cognitive neuroscientists including Hidehiko Takahashi, Noriaki Yahata, Michihiko Koeda, Tetsuya Matsuda, Kunihiko Asai, and Yoshiro Okubo have used functional Magnetic Resonance Imaging studies to examine the neural connections between the brain and guilt. We will report one such study next.

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And it’s the repository of all that you feel. The endeavor to discover the biological basis for these complex human experiences gave rise to a relatively new discipline: cognitive

neuroscience. Cognitive neuroscientists focus on the biological foundation of mental phenomena.

It recently exploded as a field because of decades of advances in neuroimaging technology that showed the brain at work. As Dr. Joel Yager, professor of psychiatry at the University of Colorado, said, "We can now watch the mind boggle!"

Certainly, you would not find an entry for "mind-boggling" in the index of a modern neuroscience textbook. You will also have a hard time finding the words "happiness" or "sadness" or "anger" or “empathy” or "love" or “fear” or, “faith”.

Z1. Cognitive neuroscientists do, however, have a rapidly growing appreciation of the emotional brain and are beginning to look closely at these subjective states, which were formerly the province of philosophers and poets. But, we must ask, what really is emotion?

ES.1. Emotion is the subjective experience that occurs during an emotional state, a usually intense and excited action of some internal feeling. It is the feeling of fear when in danger, or anger when mad, or joy when something good happens.

Researchers, whether in psychology or brain science have typically sought to account for what most people think is emotion. This was clearly their goal when they proposed several theories about the brain and brain processes that are responsible for emotions.

BS.1. They proposed that information received by sensory systems activates emotional-processing brain circuits, evaluate the meaning of stimulus input, and initiate specific emotional responses by triggering output circuits. A given circuit is only activated by stimulus information relevant to its operation.

First, we will take a closer look at fear and how it really works. It is a good, necessary, and relevant place to start, because it is an emotion that neuroscience researchers understand well and have conducted extensive research on.

ES.2. Fear is an unpleasant feeling brought on by the possibility of danger, evil, pain, hopelessness, horror, distress or real or unreal threats, but absolutely necessary to our survival. Fear ranges from mild to extreme - characterized by caution to paranoia.

As we have already mentioned in a previous segment above, many cognitive scientists and even researchers in other fields have researched fear extensively. In fact, these researchers have spent countless hours trying to understand the bases and origin of fear.

BS.2. Two deep brain structures called the amygdala manage the important task of learning and remembering what you should be afraid of. Each amygdala, a cluster of nerve cells, sits under its corresponding temporal lobe on either side of the brain.

Z2. The amygdala is practically a household word these days. The Batman comic series *Shadow of the Bat* featured a monster called "Amygdala" and recently a newspaper column called "Kids' City" discussed the role of the amygdala in all childhood fears.

ES.3. Put another way; fear is an emotional state of consciousness or of complete and utter awareness by the individual experiencing that emotional feeling. Essentially, fear is one of the human emotions that we can safely and directly claim monopolizes consciousness.

Much of what have been discovered about the neural bases of fear comes from fear conditioning studies over the past two decades. This procedure hasn't been used much to study the brain until researchers adopted it to study emotional learning.

BS.3. These studies demonstrated that information about the outside world is transmitted to the lateral nucleus from sensory-processing regions in the thalamus and cortex, allowing the amygdala to monitor for danger signs. If danger is detected, the central nucleus is activated.

We will now turn our attention to another type of human emotion that has garnered intense interest from cognitive neuroscientists and other researchers alike- explicit emotional memories. Like fear, cognitive neuroscientists have spent many research hours studying explicit emotional memories.

ES.4. Emotional explicit memories or flashbulb memories are conscious, easily verbalized memories established during emotional situations and are often especially vivid and enduring. Emotional explicit memories are also very complex and involve recall of many different facets of one particular situation.

The classic example is that most baby-boomers know where they were and what they were doing when the news of JFK's assassination broke. Studies by Jim McGaugh and colleagues have implicated brain function in the emotional amplification of explicit memory.

BS.4. In the brain, the amygdala triggers release of hormones from the adrenal gland that return to the brain. Neural activity is activated in the amygdala and the amygdala then strengthens the consolidation of explicit memories being formed during emotional arousal.

Z3. Studies in recent years led by Larry Cahill and Benno Roozendaal in McGaugh's lab have helped refine how brain function modulates the formation of explicit memories. Their research has focused on specific brain regions and their influence on explicit memories.

ES.5 Emotional explicit memories can also be defined as emotional memories that are most easily retrieved when the individual's emotional state at the time of the formation of the emotional memory matches the individual's emotional state at the time of retrieval**.**

Extensive studies by Robert Sapolsky, Bruce McEwen, Guss Pavlides, David Diamond, Tracy Shors, and Jeansok Kim suggest that stress usually play a role in impairing explicit emotional memories. Their studies have provided a better understanding of stress and emotional memories.

BS.5. During highly stressed conditions, cortisol released from the adrenal cortex rises in the bloodstream. It travels to the brain, binds to hippocampal receptors - which disrupts hippocampal activity and weakens the temporal lobe memory system's ability to form explicit memories.

Let's turn our attention to another emotion – anger. Until recently, there was little research showing how the brain processes anger. But that has begun to change and researchers have been more focused on one of the consequences of anger—aggression.

ES.6. Aggression is an emotional state that can be observed through behavior or which can be expressed internally. It can also be characterized as a feeling of hostility that incites thoughts of attack or violent actions that are hostile and unprovoked.

Researchers have found that there're differences in aggression between men and women and have indicated that men are overtly more aggressive than women. They have concluded that men's and women's brains are different, which may lead to differences in aggression.

BS.6. The orbitofrontal cortex in the front of the brain activates when judgments are made relating to anger. It helps us make decisions and temper emotional responses. Men have a lower volume of gray matter in the orbitofrontal cortex than women.

Z4. Adrian Raine and colleagues at the University of Southern California proposed that brain differences account for a healthy portion of the gender gap seen in the frequency of antisocial behavior. They have concluded that the brain is critical in aggression.

ES.7. It's noteworthy to particularly emphasize that aggression can also be defined as an expression of anger that may result from ongoing frustration about a particular situation or situations and can also be considered part of the human gene pool.

In fact, evolutionary theorists have long time been expressing their ideas and beliefs about aggression and evolution. They have argued and presented many fascinating ideas about aggression and how this one emotion has evolved over time within the human race.

BS.7. Anger triggers activity in the brain, specifically part of the brain called the dorsal anterior cingulate cortex (abbreviated dACC). The dACC's is connected to areas of the brain involved in recognizing an offense, registering a feeling, and acting on it.

Cognitive researchers have also expressed a very keen interest in anxiety and consequently they have conducted numerous research studies on it. Many have also

particularly focused attention on anxiety disorders, another common human experience. We will briefly define that next.

ES.8. Anxiety disorders are defined as emotions that exist when psychological functioning and interpersonal relationships are disrupted by symptoms such as worry and tension. They are spectrum of conditions that includes generalized anxiety, panic attacks, posttraumatic stress disorder, and obsessive-compulsive disorder.

Researchers have looked at the source of anxiety. For example, Jeffrey Gray believes that anti-anxiety drugs are vital in understanding the nature of generalized anxiety and brain circuits. Let's look at Gray's conception of anxiety at the level of neurons.

BS.8. During threats, serotonin and norepinephrine cells in the brain stem are activated and are released from terminals of these cells. Their main purpose is to enhance synaptic processing of the septum and hippocampus, leading to arousal and vigilance, and anxiety.

Z5. At its best, Gray's theory lacked key components – components that play critical roles in danger and threats. Although Gray attempted to address these shortcomings, he still didn't present a better model. Before we examine another theory, we'll first define anxiety.

ES.9. Anxiety is essentially defined as an emotional feeling that causes an individual to experience a specific cognitive state of distress, uneasiness, eagerness, tenseness, uncertainty, agitation, anticipation, or nervousness. In this state, the individuals mind is monopolized by fretful, worrying thoughts.

Many cognitive researchers have dismissed Gray's account of the nature of anxiety. They have presented a more comprehensive working model that includes more prominent components of the brain. We have already discussed the role of one of those critical components.

BS.9. When sensory information about threats are detected by the amygdala, output connections in the brain stem initiate defense responses. Some supporting physiological changes in the body give rise to signals that are returned to the brain and influence ongoing processing.

Cognitive researchers have also investigated sadness and happiness. Depression and mania are core areas of study for them but everyday ups and downs are so broadly defined that these neuroscience researchers have a hard time understanding what exactly to study.

ES.10. Sadness is an emotional feeling that is triggered by conflict, pain, social isolation, attention, body sensations, and decision making. Sadness triggers vary from, the memory of a personal loss; a friend stressing over a work conflict; seeing a desolate film.

Drs. Peter J. Freed and J. John Mann, publishing in The American Journal of Psychiatry, reported on the literature of sadness and the brain on 22 brain studies. Brain scans were on non-depressed but sad volunteers. Sadness was mostly induced.

BS.10. The amygdala and hippocampus are responsible for sadness, as do the prefrontal cortex and the anterior cingulate cortex. A structure called the insula also—it's a small region of cortex beneath the temporal lobes that registers body perceptions and taste.

Z6. As we have already mentioned, one of the core areas of study for cognitive scientists is depression. Unlike everyday sadness, cognitive neuroscientists have researched depression very extensively and broadly and consequently these researchers have come to understand it fairly well.

ES.11. Depression is a human emotional state characterized by emotional dejection and withdrawal. It is sadness, but it is a unique kind of sadness that is greater and relatively more prolonged than sadness that is usually warranted by some objective reasons.

As research advances, a better understanding about the nature of depression has emerged. In fact, cognitive scientists have found evidence of physiological connections as it relates to depression. Numerous studies have shown the same connection, which we'll briefly discuss next.

BS.11. Depression causes the adrenal cortex of the brain to secrete more of the stress-related hormone, cortisol. The amygdala and other brain regions alert hypothalamic neurons to release a peptide from the pituitary gland, which releases hormones and in turn, cortisol.

Mania is also one of the core areas of study for neuroscientists. Moreover, mania is one of the many human emotions that have generated numerous scientific studies to determine its nature. Mostly, these neuroscientists have looked at clinical manic disorder.

ES.12. Mania is defined as a mood or emotional disorder that is characterized by euphoric states, excessive activity, constant talkativeness, profuse and rapidly changing ideas, exaggerated sexuality, irritability, gaiety, decreased sleep, impaired judgment, and sometimes psychotic symptoms, such as grandiose delusions.

Numerous research studies have shown that there is definitely a link between physiological functions and mania. Like depression, science and its advanced technological approaches to measure these functions, have awarded us the unique opportunity to understand the nature of mania.

BS.12. In mania, there is an increase in dopamine transmission from the substantia nigra to the neostriatum which is associated with increased sensory stimuli and movement. The transmissions of adrenaline and serotonin from centers of the brain also increase during mania.

Z7. Happiness has also sparked interests. Music or the satisfaction it brings has been used to study happiness. Dr. Mihály Csíkszentmihályi agreed that music may not be a description of happiness, but believed that it coincides with the notion of flow.

ES.13. Happiness or flow is defined as a cognitive emotional state of concentrated attention which humans experience when they engage in certain heightened emotional situations such as listening to music. It certainly mirrors happiness and it is the absence of self-consciousness.

In his book "This Is Your Brain on Music," Dr. Daniel Levitin accounts for the brain regions responsible for music appreciation. He reports on the different regions of the brain that are responsible for the processes involved in music appreciation.

BS.13. The auditory, sensory and motor cortex, and cerebellum help us listen and respond to sounds and rhythms. Music pulls on memories for emotion via the amygdala and hippocampus. We interpret using the sensory cortex and reason via the prefrontal cortex.

The challenge to scientists becomes greater as they tackle more-complicated emotional states. And the stakes become higher, too, because research into such highly valued and personal mental processes can be easily misunderstood, specifically with emotions including empathy, love, and faith

ES.14. Empathy is more than being nice. It is the ability to feel what another person feels, and in its most refined form it is the capacity to deeply understand another person's view point. It involves attributing one’s feeling to another.

Simon Baron-Cohen, a leading researcher in the study of autism, has conducted extensive research about the neural bases of empathy. He has coined the term "mindblindness" to describe various problems with empathy. He has identified brain structures responsible for empathy.

BS.14. At the junction of the temporal and parietal lobes, the brain handles memory for events, moral judgment and biological motion (what we might call body language). And the prefrontal cortex handles many complex reasoning functions involved in feelings of empathy.

Z8. Not surprisingly, many cognitive researchers have also paid a lot of attention and conducted extensive research on love. Certainly, it is one of the many complex human emotions that cognitive neuroscientist have attempted to link to physiological functions and processes.

ES.15. Love is a feeling of warm personal attachment to or deep affection for someone. It’s characterized by how much you care about another person including a parent, child, lover, or friend. It can also mean strong enthusiasm for anything.

Pair-bonding in animals, particularly a small rodent called the prairie vole, has provided researchers a way of studying something akin to love. However, researchers have not only studied attachment behaviors, they've also studied neural bases of particular feelings of love. Circle the information the above paragraph contain.

BS.15. Parts of the brain - the insula, anterior cingulate, hippocampus and nucleus accumbens regulate body and emotional perception, memory and reward. There is also an increase in neurotransmitter activity along brain circuits governing attachment and bonding, as well as reward.

Numerous empirical research studies have also focused on understanding another human emotional state - faith. Like empathy and love, cognitive neuroscientists have faced immense difficulties and setbacks seeking to effectively understand the physiological bases of faith as it is complex.

ES.16. Faith is characterized by an act of utter confidence or trust in a person or thing. It is essentially a confident belief reaction to information, a situation, or an event that is not based on logical proof or material evidence.

The Annals of Neurology published an article by Sam Harris and colleagues exploring what happen in the brain when people exercise faith. They used functional magnetic resonance imaging (Fmri) to explore the links between physiological functioning and individuals' belief systems.

BS.16. The results indicated that when individuals exercise faith signals in the Ventromedial Prefontal Cortex (VMPC) increases. This increase in signal was particularly prominent in the region of the gyrus rectus and the orbitomedial gyrus, specifically in the left brain hemisphere.

Z9. Moral philosophers have long made the distinction between guilt and shame. Recently, cognitive neuroscientists have also started looking at these particular distinctions in relation to the neural functions. We will explore both types of human emotions, beginning with shame first.

ES.17. Shame is the awareness that one's behavior is an object of laughter and spite from others. That awareness is a very painful emotion arising from the consciousness of something dishonorable, improper, and ridiculous, done by oneself or even another individual.

Shame has also been scientifically linked to physiological functioning. Neuroscientists such as Kristin Knutson, Erin McClellan, and Jordan Grafman have conducted a functional Magnetic Resonance Imaging study to show the link between brain and shame. Their results are presented next.

BS.17. The inferior parietal lobe in the brain is activated when individuals observe any offensive shameful social gesture, such as a fascist salute. The shame they experience trigger increased activation in the parietal lobe – a part of the mirror neuron system.

As we have already mentioned earlier, guilt, like shame has also generated extensive interest from cognitive neuroscientists, recently. They have attempted to explain the nature of guilt and its neural bases. We will explore the human emotion of guilt next.

ES.18. Unlike shame, guilt is the awareness of doing something intrinsically wrong, even without witnesses. It's a feeling of responsibility or remorse for some offense, crime, and/or wrong whether real or imagined. This offense is usually against moral or penal law.

Cognitive neuroscientists including Hidehiko Takahashi, Noriaki Yahata, Michihiko Koeda, Tetsuya Matsuda, Kunihiko Asai, and Yoshiro Okubo have used functional Magnetic Resonance Imaging studies to examine the neural connections between the brain and guilt. We will report one such study next.

BS.18. There are increased activations in different parts of the brain including the medial prefrontal cortex (MPFC), left posterior superior temporal sulcus (STS), and the visual cortex when people experience guilt. These lights up when participants read passages containing guilty sentences.

Given that so much of who we are is defined by our emotions, it's important that we uncover as much as we can about the brain mechanisms of many emotions. This task is just beginning, but the future is bright.

Note. NS= Neuroscience Segment; ES= Emotion Segment; Z = Zone; Q = Question. The text read by participants did not include bolded NS, ES, Z, and Q. They are included in the appendix to assist readers of this paper in correctly identifying emotion segments, neuroscience segments, zones, and questions within the text.

APPENDIX III

GOAL MANIPULATION INSTRUCTIONS

Control-No Inserted Questions

Directions: Please read carefully before you begin reading the text.

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. At the end of the reading, you will answer some questions about the passage. When you have completed the study, you will be provided your score on the test. **Remember your goal is to read a cognitive neuroscience passage on the computer. Please read the passage with your goal in mind.**

Control-Inserted Questions

Directions: Please read carefully before you begin reading the text.

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. You will have short answer questions about the passage inserted within the text that you will have to answer on the answer sheet provided to you. Also at the end of the reading, you will be asked short-answer questions about the passage. When you have completed the study, you will be provided your score on the

questions. **Remember your goal is to read a cognitive neuroscience passage on the computer. Please read the passage with your goal in mind.**

Mastery-No Inserted Questions

Directions: Please read carefully before you begin reading the text.

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of this project is to collect data on college students' reactions to reading a cognitive neuroscience text on a computer. In today's session, you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. At the end of the reading, you will answer some questions on the passage. This session will provide you the opportunity to learn how the brain regulates emotions. When you have completed the study, you will be provided information regarding how well you learn about how the brain regulates emotions. **Remember your goal is to learn how the brain regulates emotions. Please read the passage with your goal in mind.**

Mastery-Inserted Questions

Directions: Please read carefully before you begin reading the text.

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of this project is to collect data on college students' reactions to reading a cognitive neuroscience text on a computer. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. You will

have short answer questions about the passage inserted within the text that you will have to answer on the answer sheet provided to you. Also at the end of the reading, you will be asked short-answer questions about the passage. This session will provide you the opportunity to learn how the brain regulates emotions. When you have completed the study, you will be provided information regarding how well you learn about how the brain regulates emotions. **Remember your goal is to learn how the brain regulates emotions. Please read the passage with your goal in mind.**

Performance Approach-No Inserted Questions

Directions: Please read carefully before you begin reading the text.

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of the project is to compare college students to one another in their ability to read text on a computer and successfully answer questions about the text. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. At the end of the reading, you will answer some questions on that passage.

In previous work, we have found that most UNLV students are fairly comparable in their ability to read a text on a computer and successfully answer questions about that text. However, some students stand out because they do quite well on the questions. This session will give you the opportunity to demonstrate that you are exceptional at answering questions about the text you are about to read. When you have completed the study, you will be provided information regarding how well you did compared to the

other students. **Remember your goal is to demonstrate that you are exceptional at answering the short answer questions about the passage. Please read the passage with your goal in mind.**

Performance Approach-Inserted Questions

Directions: Please read carefully before you begin reading the text.

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of the project is to compare college students to one another in their ability to read text on a computer and successfully answer questions about the text. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. You will have short answer questions about the passage inserted within the text that you will have to answer on the answer sheet provided to you. Also at the end of the reading, you will be asked short-answer questions about the passage.

In previous work, we have found that most UNLV students are fairly comparable in their ability to read a text on a computer and successfully answer questions about that text. However, some students stand out because they do quite well on the questions. This session will give you the opportunity to demonstrate that you are exceptional at answering questions about the text you are about to read. When you have completed the study, you will be provided information regarding how well you did compared to the other students. **Remember your goal is to demonstrate that you are exceptional at answering the short answer questions about the passage. Please read the passage with your goal in mind.**

Performance Avoidance-No Inserted Questions

Directions: Please read carefully before you begin reading the text.

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of the project is to compare college students to one another in their ability to read text on a computer and successfully answer questions about the text. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. At the end of the reading, you will answer some questions on that passage.

In previous work, we have found that most UNLV students are fairly comparable in their ability to read a text on a computer and successfully answer questions about that text. However, some students stand out because they do quite poorly on the questions. This session will give you the opportunity to demonstrate that you are not extremely poor at answering questions about the text you are about to read. When you have completed the study, you will be provided information on whether you did poorly compared to other students. **Remember your goal is to demonstrate that you are not extremely poor at answering the short answer questions about the passage. Please read the passage with your goal in mind.**

Performance Avoidance-Inserted Questions

Directions: Please read carefully before you begin reading the text.

We study reading patterns and the focus of today's session is on how college students read text presented on a computer. The purpose of the project is to compare college

students to one another in their ability to read text on a computer and successfully answer questions about the text. In today's session you will be reading a cognitive neuroscience passage about the brain and emotions. You will be given time to read the passage on the computer screen. You will have short answer questions about the passage inserted within the text that you will have to answer on the answer sheet provided to you. Also at the end of the reading, you will be asked short-answer questions about the passage.

In previous work, we have found that most UNLV students are fairly comparable in their ability to read a text on a computer and successfully answer questions about that text. However, some students stand out because they do quite poorly on the questions. This session will give you the opportunity to demonstrate that you are not extremely poor at answering questions about the text you are about to read. When you have completed the study, you will be provided information on whether you did poorly compared to other students. **Remember your goal is to demonstrate that you are not extremely poor at answering the short answer questions about the passage. Please read the passage with your goal in mind.**

APPENDIX IV

TABLES OF SURVEY ITEMS

Demographic Questionnaire

Please answer the following questions. Your information will be kept confidential.

1. _____ Age (in years)
2. _____ Sex (F or M)
3. _____ Grade Point Average in all your post-secondary studies (0-4.0)
4. _____ What is your academic major
5. _____ What is your academic minor
6. _____ How many classes in Biology have you had in high school?
7. _____ How many classes in Biology have you had in college?
8. _____ How many classes in Psychology have you had in high school?
9. _____ How many classes in Psychology have you had in high school?
10. _____ Year of study (e.g. Freshman, Sophomore, Junior, or Senior)
11. _____ Was English the first language you learned to speak (Yes or No).
12. If no, how old were you when you learned to speak English? _____
13. _____ Was English the first language you learned to write (Yes or No).
14. If no, how old were you when you learned to write in English? _____
15. To what degree do you enjoy reading?

    1 2 3 4 5 6 7

    Do not enjoy it Like it a lot
16. How much experience do you have working on computers?

    1 2 3 4 5 6 7

    None A lot
17. Does reading off the computer bother you?

    1 2 3 4 5 6 7

    Not at all Very much

18. Do you read material on the computer any differently than you normally read text books? _____ Yes _____ No .

If yes, please explain:

Goal Check

What was the goal that you were given for the reading?
Circle the appropriate number.

1. To demonstrate that I am exceptional at answering the short answer questions about the passage.
2. To demonstrate that I am not extremely poor at answering the short answer questions about the passage.
3. To learn how the brain regulate emotions.
4. To read a cognitive neuroscience passage on the computer.

Did you keep your goal in mind while you were reading?

1. Yes
2. No

Pattern of Adaptive Learning Scale
Student Version

Here are some questions about yourself as a student in your Educational Psychology class. Please circle the number that best describes what you think.

1. It's important to me that I don't look stupid in class.

   1 **2** **3** **4** **5**
   Not at all true Somewhat true Very true

2. It's important to me that other students in my class think I am good at my class work.

   1 **2** **3** **4** **5**
   Not at all true Somewhat true Very true

3. It's important to me that I learn a lot of new concepts this year.

   1 **2** **3** **4** **5**
   Not at all true Somewhat true Very true

4. One of my goals is to show others that I'm good at my class work.

   1 **2** **3** **4** **5**
   Not at all true Somewhat true Very true

5. One of my goals in class is to learn as much as I can.

   1 **2** **3** **4** **5**
   Not at all true Somewhat true Very true

6. One of my goals is to keep others from thinking I'm not smart in class.

   1 **2** **3** **4** **5**
   Not at all true Somewhat true Very true

7. One of my goals is to master a lot of new skills this year.

   1 **2** **3** **4** **5**
   Not at all true Somewhat true Very true

8. One of my goals is to show others that class work is easy for me.

   1 **2** **3** **4** **5**
   Not at all true Somewhat true Very true

9. It’s important to me that I thoroughly understand my class work.

1	**2**	**3**	**4**	**5**
Not at all true		Somewhat true		Very true

10. One of my goals is to look smart in comparison to the other students in my class.

1	**2**	**3**	**4**	**5**
Not at all true		Somewhat true		Very true

11. One of my goals in class is to avoid looking like I have trouble doing the work.

1	**2**	**3**	**4**	**5**
Not at all true		Somewhat true		Very true

12. It’s important to me that I look smart compared to others in my class.

1	**2**	**3**	**4**	**5**
Not at all true		Somewhat true		Very true

13. It’s important to me that my teacher doesn’t think that I know less than others in class.

1	**2**	**3**	**4**	**5**
Not at all true		Somewhat true		Very true

14. It’s important to me that I improve my skills this year

1	**2**	**3**	**4**	**5**
Not at all true		Somewhat true		Very true

Prior Knowledge Questionnaire

Directions: Please indicate how much you KNOW by circling one of the numbers on the 7 point scale.

1. How much would you say you know about the brain and how it regulates emotions?

1 2 3 4 5 6 7
Nothing A great deal

2. How familiar are you with the functions of the brain and how it regulates emotions?

1 2 3 4 5 6 7
Nothing A great deal

3. How much would you say you read passages about the brain and emotions?

1 2 3 4 5 6 7
Nothing A great deal

4. How much would say you heard (e.g., a lecture) about the brain and emotions?

1 2 3 4 5 6 7
Nothing A great deal

Interest Questionnaire

Directions: Please indicate how strongly you agree or disagree with each statement using the following 5-point scale.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

1. I thought this passage was very interesting.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

2. The passage really grabbed my attention.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

3. I would read the passage again if I had the chance

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

4. I thought this passage was fascinating.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

5. The passage was personally relevant to me.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

6. I would like to read more about this topic in the future.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

7. I'd like to discuss this passage with others at some point.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

8. I'll probably think about the implications of this passage for some time to come.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

9. I got caught up in the text without trying to.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

10. The passage was one of the most interesting things I've read in a long time.

Strong Disagree	Disagree	Neutral	Agree	Strong Agree
1	2	3	4	5

Metacognitive Awareness Survey

1. Describe the type of inserted questions you were given in the passage (the type of text information they contained):

2. At what point did you realize what your questions were? Ex. 2nd question, 3rd question, ¼ way through the passage, ½ through the passage, etc.

3. Did you change your reading strategy based on the questions that you were given?

4. Explain how you changed your reading strategy. Ex. You changed from what to what?

5. Where did you change your reading strategy? Ex. ¼ way through the passage, ½ through, etc.

APPENDIX V

POST TEST ITEMS

Post Test

1. _____ is the subjective experience that occurs during an emotional state.
2. They proposed that information received by sensory systems activates emotional-processing _____ circuits, evaluate the meaning of stimulus input, and initiate specific emotional responses by triggering output circuits.
3. _____- is an unpleasant feeling brought on by the possibility of danger, evil, pain, hopelessness, horror, distress or real or unreal threats, but absolutely necessary to our survival.
4. Two deep brain structures called the _____ manage the important task of learning and remembering what you should be afraid of.
5. Essentially, _____ is one of the human emotions that we can safely and directly claim monopolizes consciousness.
6. These studies demonstrated that information about the outside world is transmitted to the lateral _____ from sensory-processing regions in the thalamus and cortex, allowing the amygdala to monitor for danger signs.
7. _____ explicit memories or flashbulb memories are conscious, easily verbalized memories established during emotional situations and are often especially vivid and enduring.
8. In the _____, the amygdala triggers release of hormones from the adrenal gland that return to the brain.
9. Emotional _____memories can also be defined as emotional memories that are most easily retrieved when the individual's emotional state at the time of the formation of the emotional memory matches the individual's emotional state at the time of retrieval.
10. During highly stressed conditions, cortisol released from the adrenal _____rises in the bloodstream.
11. _____ is an emotional state that can be observed through behavior or which can be expressed internally.
12. The _____ cortex in the front of the brain activates when judgments are made relating to anger.
13. It is noteworthy to particularly emphasize that aggression can also be defined as an expression of _____ that may result from ongoing frustration about a particular situation or situations and can also be considered part of the human gene pool.
14. Anger triggers activity in the brain, specifically part of the brain called the _____ anterior cingulate cortex (abbreviated dACC).

15. _____ disorders are defined as emotions that exist when psychological functioning and interpersonal relationships are disrupted by symptoms such as worry and tension.
16. During threats, _____ and norepinephrine cells in the brain stem are activated and are released from terminals of these cells.
17. Anxiety is essentially defined as an emotional feeling that causes an individual to experience a specific cognitive _____ of distress, uneasiness, eagerness, tenseness, uncertainty, agitation, anticipation, or nervousness.
18. When sensory information about threats is detected by the amygdala, output connections in the brain _____ initiate defense responses.
19. _____ is an emotional feeling that is triggered by conflict, pain, social isolation, attention, body sensations, and decision making.
20. The amygdala and _____ are responsible for sadness, as do the prefrontal cortex and the anterior cingulate cortex.
21. _____ is a human emotional state characterized by emotional dejection and withdrawal.
22. Depression causes the _____ cortex of the brain to secrete more of the stress-related hormone, cortisol.
23. _____ is defined as a mood or emotional disorder that is characterized by euphoric states, excessive activity, constant talkativeness, profuse and rapidly changing ideas, exaggerated sexuality, irritability, gaiety, decreased sleep, impaired judgment, and sometimes psychotic symptoms, such as grandiose delusions.
24. In mania, there is an increase in _____ transmission from the substantia nigra to the neostriatum which is associated with increased sensory stimuli and movement.
25. _____ or flow is defined as a cognitive emotional state of concentrated attention which humans experience when they engage in certain heightened emotional situations such as listening to music.
26. The auditory sensory and motor _____ and cerebellum help us listen and respond to sounds and rhythms.
27. _____ is more than being nice.
28. At the junction of the temporal and parietal _____, the brain handles memory for events, moral judgment and biological motion (what we might call body language).
29. _____ is a feeling of warm personal attachment to or deep affection for someone.
30. Parts of the _____ - the insula, anterior cingulate, hippocampus and nucleus accumbens regulate body and emotional perception, memory and reward.
31. _____ is characterized by an act of utter confidence or trust in a person or thing.
32. The results indicated that when individuals exercise faith, _____ in the Ventromedial Prefontal Cortex (VMPC) increases.
33. _____ is the awareness that one's behavior is an object of laughter and spite from others.

34. The _____ parietal lobe in the brain is activated when individuals observe any offensive shameful social gesture, such as a fascist salute.
35. Unlike shame, _____ is the awareness of doing something intrinsically wrong, even without witnesses.
36. There are increased _____ in different parts of the brain including the medial prefrontal cortex (MPFC), left posterior superior temporal sulcus (STS), and the visual cortex when people experience guilt.

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