

ABSTRACT

Title of Dissertation: THE EFFECTS OF REWARD PROXIMITY AND CHOICE OF REWARD ON THE READING MOTIVATION OF THIRD-GRADE STUDENTS.

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This study investigated the effects of reward proximity and choice of reward on the reading motivation of third-grade average readers. Seventy-five students participated in the study. Participants were randomly assigned to one of four treatment groups (book/choice, book/no choice, token/choice, token/no choice) and a control group that received no reward. All students who participated in this study were invited to read from one of six trade books that were being considered for purchase in the school library. After making his or her recommendation about the book, each student received a reward or no reward based on treatment condition. The student was then invited to remain in the experimental room and was observed during a 10-minute free-choice period. During the free-choice period, the child could choose to continue reading from the library book array or choose a jigsaw puzzle or a math game.

The effect of the independent variables, proximity of reward and choice of reward, on intrinsic motivation to read was measured with three indicators of task persistence and a question of self-reported enjoyment. The indices of persistence were first activity selected, time spent reading, and number of words read. The self-report

measure was the response to a question regarding the "most fun activity" in the experimental room.

The present study indicated that the students given a book (proximal reward) and the students who received no reward were more motivated to engage in subsequent reading than the students that received a token (less proximal reward). The findings from the present study indicate that the proximity of the reward to the desired behavior is a particularly salient factor in enhancing motivation.

In addition, the findings from the study suggest that less proximal rewards, such as tokens, undermine intrinsic motivation. Finally, although choice has been demonstrated to be a powerful aspect of intrinsic motivation (Deci, 2000; Rigby et al., 1992; Gottfried, 1985; Guthrie & Wigfield, 1997), the choice of reward was not found to be a salient factor in this study. The type of reward (book or token) was a significant factor, while choice of reward had no apparent effect on the intrinsic motivation to read.

THE EFFECTS OF REWARD PROXIMITY AND CHOICE OF REWARD
ON THE READING MOTIVATION OF THIRD-GRADE STUDENTS

by

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DEDICATION

To my mother, Susan Mary Morris, who always believed.

To my husband, Joseph Matthew Marinak, who made it possible.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
DEDICATION	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
CHAPTER I: INTRODUCTION	1
Purpose of the Study	1
Rationale	2
Theoretical Context: Rewards and Reading Motivation	4
Cognitive Models of Motivation	5
Reward Proximity Hypothesis.....	8
Reading Engagement Constructs.....	9
Intersection of Constructs Related to Rewards and Reading Motivation.....	12
Significance of the Study	14
Research Questions	15
Definition of Terms	16
Limitations of the Study	18
Assumptions of the Study	19
Overview of Method	19
Experimental Activity	20
Free-Choice Period.....	21
Measures of Intrinsic Reading Motivation.....	21
CHAPTER II: REVIEW OF LITERATURE.....	23
Organization of the Literature Review	24
Section I: Theoretical Models Related to Extrinsic Rewards and Intrinsic Motivation	25
Behaviorism	27
Self-Perception or Attribution Theory and Overjustification Hypothesis	29
Personal Causation and Cognitive Evaluation Theory (CET).....	31
Section II: Reading Motivation Studies	33
Empirical Studies of Reading and Rewards	33
Qualitative Studies of Reading and Rewards	38
Survey Research of Reading and Rewards.....	39
Implications of Reading Motivation Studies.....	41
Section III: Token Economy Studies.....	41
Token Economies to Shape Behavior.....	43
Token Economies to Increase Academic Achievement	44
Concerns Regarding Token Economy Experimentation	45
Tokens as Bonuses or Bribes.....	47
Implications of Token Economy Experimentation.....	48
Section IV: Reward Contingency Experimentation	49
First Experimentation in CET	49
Defining the Parameters of Overjustification.....	55
Methodological Concerns About Reward Contingency Designs	68
Conclusions Questioned in Reward Contingency Studies.....	75
Implications of Reward Contingency Studies	94
Section V: Reward Contingency Meta-Analyses	100
Meta-Analysis of CET	101
Meta-Analysis of Contingent Rewards and Interest.....	104
Meta-Analysis of Overjustification	106
Meta-Analysis of Extrinsic Rewards and Intrinsic Motivation	110
Second Meta-Analysis of Extrinsic Rewards and Intrinsic Motivation.....	115
Implications of Reward Contingency Meta-Analyses.....	122

Section VI: Choice as a Variable	124
Early Experiments Using Choice as a Variable.....	124
Perceived Choice as a Variable	127
Defining Parameters of Choice	129
Choice and Reading Motivation.....	131
Implications of Choice as a Variable in Reward Contingency Studies	132
Section VII: Designing Reading Reward Contingency Studies	133
Conclusion.....	136
CHAPTER III: METHODOLOGY	139
Research Design.....	139
Participants.....	140
Variables	140
Materials.....	142
Motivation to Read Profile.....	142
Books for Library Selection	142
Literacy Reward (books).....	143
Nonliteracy Reward (tokens).....	143
Jigsaw Puzzle	143
Math Game.....	143
Measures	144
First Activity Selected.....	145
Number of Seconds Spent Reading.....	145
Number of Words Read.....	145
Most Fun Activity	145
Procedures	145
Permission	145
Administration of the Motivation to Read Profile.....	146
Assignment to Treatment Condition	146
Experimental Activity	146
Treatment Condition 1: Book/Choice	150
Treatment Condition 2: Book/No Choice.....	150
Treatment Condition 3: Token/Choice	151
Treatment Condition 4: Token/No Choice	152
Treatment Condition 5: No Reward/No Choice	152
Data Analysis	153
Analysis of Reading Motivation Prior to Study Implementation	153
First Activity Selected.....	154
Number of Seconds Spent Reading.....	154
Number of Words Read.....	155
Most Fun Activity	156
CHAPTER IV: RESULTS AND DISCUSSION	157
Assessment of Reading Motivation Prior to Study Implementation	158
Reliability and Validity of the Motivation to Read Profile	158
Analysis of Reading Motivation Prior to Experimentation	159
Task Persistence as a Measure of Intrinsic Reading Motivation: First Activity Selected	160
Task Persistence as a Measure of Intrinsic Reading Motivation: Seconds Spent Reading	166
Task Persistence as a Measure of Intrinsic Reading Motivation: Number of Words Read.....	171
Self-Report Question as a Measure of Intrinsic Motivation: Most Fun Activity	176
CHAPTER V: SUMMARY AND CONCLUSIONS	177
Purpose.....	177
Research Questions	177
Findings and Discussion.....	177
Conclusions	181
Implications.....	182
Implication for Theory	183
Implications for Research.....	185

Implications for Practice	188
APPENDIX A: Readability of Library Book Array	191
APPENDIX B: Review of Research Using Human Subjects	192
APPENDIX C: District Permission.....	193
APPENDIX D: Parent Information Letter	194
APPENDIX E: Parent Consent Form.....	195
APPENDIX F: Library Book Annotations.....	196
REFERENCES	197

LIST OF TABLES

Table 1. Results of Motivation to Read Profile (MRP).....	160
Table 2. First Activity Selected by Treatment Group	161
Table 3. First Activity Selected and Subsequent Activity Changes.....	162
Table 4. Chi-Square Test of First Activity Selected ($n = 75$).....	162
Table 5. First Activity Selected By Choice/No Choice.....	163
Table 6. Chi-Square Test for the Choice/No Choice Group ($n = 75$)	164
Table 7. First Activity Selected by Proximity of Reward	164
Table 8. Chi-Square Tests for the Book Group and the Token Group ($n = 60$).....	165
Table 9. Chi-Square Tests for the Book Group and the Control Group ($n = 45$).....	165
Table 10. Chi-Square Tests for the Token Group and the Control Group ($n = 45$)	166
Table 11. Means and Standard Deviations for Number of Seconds Spent Reading	167
Table 12. ANOVA for the Number of Seconds Spent Reading.....	167
Table 13. Fisher's LSD Test for the Number of Seconds Spent Reading.....	168
Table 14. Means and Standard Deviations for Number of Seconds Spent Reading By Proximity of Reward	169
Book Group 339.0333 242.5441	169
Table 15. ANOVA for Number of Seconds Reading By Proximity of Reward	170
Table 16. Fisher's LSD Test for Number of Seconds Spent Reading By Proximity of Reward.....	170
Table 17. Means and Standard Deviations for Number of Words Read.....	172
Table 18. ANOVA for Number of Words Read	173
Table 19. Fisher's LSD Test for Number of Words Read.....	173
Table 20. Means and Standard Deviations for Number of Words Read by Proximity of Reward.....	174
Table 21. ANOVA for Number of Words Read by Proximity of Reward.....	175
Table 22. Fisher's LSD Test for Number of Words Read by Proximity of Reward.....	175

LIST OF FIGURES

Figure 1: Treatment Conditions 20

CHAPTER I: INTRODUCTION

Purpose of the Study

After five decades of intensive research, questions remain about the effect of extrinsic rewards on intrinsic motivation. Researchers continue to debate passionately the conditions under which rewards undermine intrinsic motivation (Cameron, 2001; Decci, Koestner, & Ryan, 2001). A number of investigations (Condry, 1977; McLoyd, 1979), including several meta-analyses (Cameron & Pierce, 1994; Deci, Koestner, & Ryan, 1999; Eisenberger & Cameron, 1996; Tang & Hall, 1995; Wiersma, 1992) have examined the differential effects of variables such as interest and reward value on intrinsic motivation. For example, studies have concluded that being rewarded for engaging in a low-interest activity produces more involvement in the task (Lepper, Greene, & Nisbett, 1973; McLoyd, 1979). Also, if a reward is valued, interest in a task can be enhanced (McLoyd, 1979). In addition, the effects of specific social context factors, such as choice, have been studied. An environment that emphasizes choice rather than control has been found to enhance learning motivation (Kohn, 1994; Rigby, Deci, Patrick, & Ryan, 1992).

However, little research has examined the effect of two important variables seen in reward contingency studies on intrinsic reading motivation—type of reward and choice of reward. Furthermore, the possible interaction between these two important variables has not been investigated. More precisely, no one has examined the effects of the proximity of the reward offered to the desired learning behavior (e.g., providing books as a reward for reading). In proposing a reward proximity hypothesis, Gambrell (1996) has suggested that the more proximal the reward is to the desired behavior, the less undermining it will be to intrinsic motivation. In addition, although choice has been a variable in many reward

contingency studies, few studies have specifically investigated the effect of choice of reward on intrinsic motivation.

The purpose of this study was to explore the reward proximity hypothesis and the effect of choice of reward on intrinsic motivation (Gambrell, 1996). Specifically, the experiment investigated the effects of two independent variables, proximity of reward and choice of reward, on the intrinsic motivation to read of third-grade students. The first independent variable, reward type, consisted of a reward that was proximal to the desired behavior of reading motivation (literacy reward—book) and a reward less proximal to the desired behavior (nonliteracy reward—token). Choice of reward, the second independent variable, included offering participants a choice of a literacy reward (choice of a book) or a choice of a nonliteracy reward (choice of a token). The design allowed the researcher to study the effect of reward type and choice of reward singly on intrinsic reading motivation and to investigate interactions that might exist between the two independent variables.

Rationale

Teachers and administrators seem to believe that extrinsic rewards can enhance intrinsic motivation. Studies indicate that teachers have used incentive programs in the classroom (Cameron & Pierce, 1994; Guthrie & Wigfield, 2000; Lepper & Greene, 1975; Tang & Hall, 1995). These incentive programs do not appear to be limited to nonacademic issues such as attendance or behavior. Research indicates that many classroom teachers develop or take advantage of programs that reward academics such as reading or mathematics (Fawson & Moore, 1996).

Furthermore, research indicates that there are certain beliefs and behaviors about motivation that teachers are interested in supporting or developing as they arrange incentive programs in classrooms (Cameron & Pierce, 1994). There is, however, little information

about how these belief systems relate to one another. It is clear that competence beliefs, achievement values, and intrinsic motivation relate positively to one another (Guthrie & Wigfield, 1997). Teachers who are interested in supporting or nurturing motivated learners are those, for example, who want children to (a) think they are competent, (b) choose more challenging activities, and (c) set challenging goals for themselves (Guthrie & Wigfield, 1997).

In addition, high-stakes testing in reading achievement has resulted in educators using reward-based reading programs in two specific arenas. First, to increase reading motivation within a classroom or school building, teachers and administrators are organizing or adopting programs that include goals and prizes for wide reading (Fawson & Moore, 1999). Second, many intervention models contain components designed to increase both reading achievement and reading motivation. These frameworks for reading intervention include reinforcers such as displays of fluency, distribution of tangible rewards, and/or behavior-specific praise (Gambrell & Marinak, 1997). There is, however, growing concern about the use of reward systems in educational settings (Cameron & Pierce, 1994; Deci et al. 1999a; Kohn, 1994). Specifically, there continues to be controversy about whether rewards or incentives have a detrimental effect on the intrinsic motivation to read.

Dichotomous theories of motivation that contrast learning as a self-initiated process and learning as a conditioning process provide a context for viewing motivation as either intrinsic or extrinsic, respectively (Gambrell & Marinak, 1997). Deci (1972) and Csikszentmihalyi (1991) contend that learning is a series of intrinsically motivated actions that are performed out of interest and require no incentive other than the experience or satisfaction that accompanies them. In contrast, Bandura (1977) defines extrinsic motivation

as learning that occurs as a result of forces from outside the individual, something imposed on the individual.

Associated with both theories of motivation are reward contingencies. According to Deci (1972), the act of completion and learning is intrinsically motivating and, therefore, extrinsic rewards are potentially undermining. Some studies of general task motivation (i.e., returning to a puzzle or game) have specified numerous conditions under which extrinsic rewards given for engaging in the activity decrease subsequent interest in the activity (Lepper & Greene, 1975; Lepper, Greene, & Nisbett, 1973).

However, other investigations (Cameron & Pierce, 1994) have shown that both intangible (praise, feedback, etc.) and tangible (certificates, bookmarks, etc.) extrinsic rewards can positively influence motivation. Specifically, a number of researchers have demonstrated that under certain conditions, extrinsic rewards can enhance motivation (Brennan & Glover, 1980; Cameron & Pierce, 1994; McLoyd, 1979). Determinants that seem to result in enhanced intrinsic motivation are interest in the activity (McLoyd, 1979), the type of extrinsic reward offered (Cameron & Pierce, 1994), and choice of reward (Freehan & Enzle, 1991). It is noteworthy that with the exception of McLoyd (1979), none of the aforementioned studies examined the effect of extrinsic rewards on a specific task motivation such as the intrinsic motivation to read, nor have any empirical investigations to date studied the effects of rewards that were more and/or less proximal to the type of motivation be measured.

Theoretical Context: Rewards and Reading Motivation

This study was informed, directly and indirectly, by theoretical work in a number of disciplines, including psychology, human development, and education. The three motivation models around which most empirical experimentation has been conducted—behaviorism,

self-perception, and personal causation—are thoroughly discussed in the review of literature. However, in addition to these three widely acknowledged and investigated models, additional theoretical constructs were considered due to the content-specific motivation being investigated. Work in cognition, reward proximity, and reading engagement were reviewed to appropriately inform this study of intrinsic reading motivation. These additional constructs are presented in the following sections. The first section briefly examines cognitive models of motivation. The second section discusses reward proximity hypothesis. The third section reviews reading engagement constructs. The fourth section proposes theoretical intersections specifically related to rewards and reading motivation.

Cognitive Models of Motivation

For this discussion, cognitive models are contrasted with a behaviorist definition of drive and motivation. All the cognitive models relate observations and descriptions of motivation to how such sensory input is transformed, reduced, elaborated, stored, recovered, and used (Neisser, 1967). Several cognitive motivation theories are referenced, directly or indirectly, as researchers have investigated the role of rewards on intrinsic motivation. These include, but are not limited to, personal causation theory (deCharms, 1968), self-perception theory (Bem, 1972), cognitive evaluation theory (CET) (Deci & Ryan, 1980), self-determination theory (Deci & Ryan 1985), social cognitive theory (Bandura, 1986), social constructivism (Vygotsky, 1978), and choice theory (Rachlin, Logue, Gibbon, & Frankel, 1986).

Central to many of the cognitive theories of motivation is the desire to understand the process by which people explain and understand their own actions and the causes of those actions (Lepper et al., 1973). DeCharms (1968) defines motivation as a force beyond the desire of the organism to avoid punishment, reduce stress, or satisfy needs. His theory of

personal causation considers the relationship between motivation and learning in humans. Personal causation is the initiation of behavior that is intended to produce a change in the environment (deCharms, 1968). DeCharms (1968) characterizes these behaviors as motives. Motives in personal causation theory include attributes of human learning such as achievement and personal knowledge.

Self-perception theory (Bem, 1972) refers to a self-directed inferential process. For example, when an individual observes another person engaging in some activity, he or she infers that the other person is intrinsically motivated to engage in the activity to the extent that he or she does not perceive external contingencies to which they attribute the behavior. Self-perception theory proposes that a person engages in a similar inferential process about his or her own behavior and its meaning. To the extent that external reinforcement contingencies controlling that behavior are salient and sufficient, the person will attribute the behavior to these controlling circumstances. However, if the external contingencies are not perceived as salient or sufficient to account for the behavior, the person will attribute the behavior to his or her own dispositions, interests, and desires (Bem, 1972).

Cognitive evaluation theory (Deci & Ryan, 1980) is not a theory solely about rewards. Rather, it theorizes how factors affecting perceived autonomy and competence influence intrinsic motivation. According to CET, competence and self-determination underlie intrinsic motivation. Rewards can facilitate or hinder competence and self-determination depending upon whether they are perceived as informational, controlling, or motivational.

Many cognitive theories of motivation have the concept of intention at their core. The theory of personal causation, self-perception theory, and CET are concerned with the factors that promote (or fail to promote) peoples' understanding of behavior. Unlike these constructs

of motivation, self-determination theory, a model Deci and Ryan (1985) proposed to broaden CET, distinguishes between self-determined and controlled types of internal regulation (Deci & Ryan, 1985). Motivated actions are self-determined to the extent that they are engaged in wholly volitionally, whereas actions are controlled if they are compelled by some interpersonal or intrapsychic force (Deci, Vellerand, Pelletier & Ryan, 1991). In other words, when a behavior is self-determined, the regulatory process is choice. When it is controlled, the regulatory process is compliance or defiance.

Bandura (1986), in his social cognitive theory, proposes that human behavior depends upon reciprocal interactions among thoughts and beliefs, behaviors, and environmental factors. Specifically, self-efficacy beliefs influence such behaviors as choice of task, effort, persistence, and achievement. A number of researchers have used Bandura's (1986) work in self-efficacy to explore self-perceptions in specific disciplines, such as reading and writing (Henk & Melnick, 1992, 1998; Bottomley, Truscott, Marinak, Henk, & Melnick, 1999). Somewhat related to social cognitive theory (Bandura, 1986) is social constructivist theory (Vygotsky, 1978) and choice theory (Rachlin et al., 1986). Social constructivist theorists contend that learning and the motivation to learn cannot be separated from the social context of the activity. Furthermore, cognition and social processes cannot be separated because they are socially constructed by the individual and/or participants (Vygotsky, 1978). Choice theory, one aspect of social constructivism, is studied in terms of the preferences one has for engaging in activities or in choosing the consequences of the activity (Rachlin et al., 1986). Choice theory suggests that choice over schedule of rewards or types of rewards can prevent potentially damaging effects of extrinsic rewards on high levels of preexisting intrinsic motivation (Deci & Ryan, 1985). Additionally, it is theorized that choice of reward can enhance motivation in initially low-interest activities (Langer & Rodin, 1996).

Although all the preceding models are relevant in the broader exploration of intrinsic motivation, three have been used and debated as the theoretical underpinnings of reward contingency research. Behaviorism, self-perception (overjustification hypothesis), and personal causation (CET) continue to be the major theoretical constructs used to explain the enhancing and/or undermining effects of reward on intrinsic motivation. Reward proximity hypothesis (Gambrell, 1996) is a more recent attempt to further define the types and proximity of rewards that might undermine motivation.

Reward Proximity Hypothesis

Reward proximity hypothesis (Gambrell, 1996) examines the relationship of the reward to the desired behavior. One notable characteristic of both teacher praise and feedback is that they are always closely linked to the desired student behavior, whereas extrinsic rewards are usually unrelated to the desired behavior. In the reward proximity construct, Gambrell (1996) suggested that intrinsic motivation is enhanced when the reward is closely linked to the desired behavior. In other words, a reader's intrinsic interest in reading is enhanced when the incentive not only rewards the behavior of reading but also reflects the value of and encourages future engagement in that behavior.

Theorists have indicated that a great deal has yet to be determined regarding the nature of motivation, especially within disciplines (Gottfried, 1985; Guthrie & Wigfield, 1997). Gottfried (1985) reported that students' self-reported intrinsic motivation for reading, math, science, and social studies are not highly correlated with each other. Blumenfeld (1992) suggests that greater specificity is needed in motivation construct definitions, especially within content domains. Guthrie and Wigfield (1997) proposed that intrinsic reading motivation could be differentiated into multiple constructs of motivation, including reading challenge, curiosity, and involvement. Recently, a comprehensive construct has been

proposed that takes into account a reader's intrinsic motivation and his/her ability to use strategies. Reading engagement is a theoretical model that describes the joint functioning of motivations and strategies during reading (Guthrie, Van Meter, McCann, Wigfield, Bennett, Poundstone, Rice, Faibisch, Hunt, & Mitchell, 1996).

Reading Engagement Constructs

Theoretical constructs of reading motivation attempt to explain the behaviors, both of students and teachers, that cause readers to engage (or not) with text. Reading engagement refers to the joint functioning of motivations and strategies during reading (Guthrie et al., 1996). The reward proximity hypothesis (Gambrell, 1996) considers the relationship between the intrinsic motivation to read, the presence of proximal and less proximal rewards, and sustained engagement with text. Alvermann and Guthrie (1993) define engaged readers as those who acquire the competencies and motivations to read for diverse purposes. This includes behaviors such as gaining knowledge, performing a task, interpreting an author's perspective, sharing reactions to stories and informational text, escaping into the literary world, or taking social and political action in response to what is read. Alvermann and Guthrie (1993) suggest that highly engaged readers are motivated, knowledgeable, and socially interactive.

The theoretical framework for reading engagement contains four components that define engaged readers: motivations for reading, motivations for strategy use in reading, motivations for conceptual learning from text, and the contextual influences on motivations for reading (Guthrie & Wigfield, 1997).

Motivations for reading in the framework of reading engagement are the internalized goals that lead to literacy choices and comprehension strategies (Pintrich & Schrauben, 1992). This goal-oriented view classifies students' goals as intrinsic or extrinsic. Intrinsically

motivated readers choose to read, have an inherent interest in what they are reading, and enjoy using strategies to construct meaning (Gottfried, 1985). Extrinsic motivation for reading refers to motivation that originates outside the learner. Readers who are extrinsically motivated do not consistently choose to read, do not read to complete assignments or please the teacher, and are not dependent on the guidance of others to construct meaning (Guthrie & Wigfield, 1997).

Motivations for strategy use can be viewed in general cognitive terms and more specifically as they relate to reading engagement. A number of general cognitive strategies are associated with various motivations. Volitional strategies such as application, self-monitoring, and self-evaluation appear to be contingent upon different types of motivations (Corno, 1993). When intrinsically motivated, students will engage in these volitional strategies because learning is personally important. Extrinsically motivated students, on the other hand, may also engage in the strategies but no personal satisfaction is attached to the behaviors. Their reasons for employing these volitional strategies may include extrinsic motivators such as teacher recognition, grades, and the like. Other motivations, such as fear of failure, may result in students setting low goals and selecting less challenging reading material.

Similar relationships have been documented in reading strategy use (Meece, Blumefeld, & Hoyle, 1988; Pintrich & De Groot, 1990). Intrinsic motivation has been found to be highly correlated with reading strategies such as self-regulation, self-questioning, and summarization. Intrinsically motivated readers were also found to have higher standardized test scores. Extrinsically motivated readers were found to use fewer strategies less frequently and had lower standardized test scores (Finn & Cox, 1992).

Motivation for conceptual learning from text is the third component of the reading engagement construct. Students who are intrinsically motivated to learn will read for deeper understanding, thereby gaining higher levels of conceptual knowledge (Guthrie & Wigfield, 1997). Students whose motivations are extrinsic are more likely to engage in rote learning and verbatim demonstration of knowledge (Pintrich, Marx, & Boyle, 1993).

Contextual influences on motivations for reading represents the final component of the reading engagement framework. Researchers have suggested that it is impossible to separate the context of instruction from learning motivations (Ames, 1992; Deci, 1980; Turner, 1995). Although more research is needed on this component, a number of studies suggest that the intrinsic motivation to read can be enhanced if the instructional context is socially interactive (Ames, 1992), provides choices to the reader (Turner, 1995), and contains real-world literacy tasks (Newby, 1991).

Reading engagement is a complex motivation framework that draws from the work of many theorists. Social cognitive theory (Bandura, 1986) and social constructivist theory (Vygotsky, 1978) explain how one who is motivated remains motivated. Social cognitive theory (Bandura, 1986) postulates it is the efficacy expectation (i.e., the expectation that one can improve at a task) that results in an effort to persist. Social constructivist theory (Vygotsky, 1978) contends that intrinsic motivation results from the process of deriving meaning. Both constructs assume engagement in an activity. Children who are motivated to read engage in the activity often and create their own opportunities to read. Children who are not motivated to read do not create opportunities to interact with books. Thus the questions: How can intrinsic motivation be nurtured in children who are not motivated to read, who find reading difficult, or who exhibit a lack of achievement in reading? Second, should these children be rewarded for reading or reading achievement? In light of school-wide and

program-wide reward systems (Flora & Flora 1999; Gambrell & Marinak, 1997) in elementary schools, a final question is especially critical: Are external rewards routinely undermining in students who are motivated to read? If not, under what conditions can intrinsic reading motivation be supported?

Intersection of Constructs Related to Rewards and Reading Motivation

Prior to the meta-analysis by Cameron and Pierce (1994), many studies specified numerous conditions under which extrinsic rewards given for engaging in an activity decrease subsequent interest in the activity (Lepper & Greene, 1975; Lepper et al., 1973). These so-called “undermining” studies were often interpreted within the framework of deCharms’s (1968) theory of personal causation and Bem’s (1972) self-perception theory. Both deCharms (1968) and Bem (1972) suggest that extrinsic rewards decrease intrinsic interest in a task because, upon receipt of the reward, the perception that one is engaging in the activity because of self-propelled interest is supplanted by the perception that one is engaging in the task for the reward. Consequently, the activity is then viewed as a means to a reward and little interest in the activity is aroused in the absence of the reward.

However, research from the past two decades suggests that the undermining effects of rewards can be avoided under certain conditions. These so called “redefining” studies provide evidence that carefully chosen rewards offered under certain conditions can enhance intrinsic motivation (Cameron & Pierce, 1994; Deci et al., 1999; McLoyd, 1979). Cognitive evaluation theory sheds light on the finding by a number of researchers that the effects of reinforcement vary based upon the reward contingency (Cameron & Pierce, 1994; Deci et al., 1999; Eisenberger & Cameron, 1996) According to CET, competence and self-determination underlie intrinsic motivation. Rewards can facilitate intrinsic motivation if they are perceived as informational or motivational.

The theoretical constructs of deCharms (1968) and Bem (1972), however, do not directly address several important variables when considering intrinsic motivation. These variables pertain to the differential parameters of intrinsic motivation. Condry (1977) and McLoyd (1979) note a number of these variable omissions in reward studies, including the differential effects of initial interest and the differential effects of reward value. For example, how interested is the individual in the task prior to a reward contingent? How much is the reward valued by the individual engaging in the activity? And how closely linked are the reward and the desired behavior? Condry (1977) and McLoyd (1976) note that when studying motivation, most researchers selected only subjects who showed high initial interest in the tasks and paid little attention to the value placed on a reward by the subject.

Cognitive evaluation theory purports that rewards, perhaps of differential value, can enhance the intrinsic motivation to read if they are viewed as informational or motivational. For children who lack the motivation to read, the reward can serve as the catalyst necessary to stimulate engagement. As reluctant readers engage in the activity more, their competence presumably grows (Deci & Ryan, 1985). Social cognitive theory and social constructivism contend that as competence grows, the intrinsic motivation to continue reading results not from the reward but from an increasing ability to construct meaning (Bandura, 1986; Vygotsky, 1978).

It is suggested that the effects of rewards on reading motivation can be drawn from several theoretical constructs, with an important premise being how proximal the reward is to the desired behavior. The reward proximity hypothesis (Gambrell, 1996) contends that incentives that are reading-related link the reward to the desired behavior. In other words, children who receive a book as a reward for reading might be motivated to continue reading. Cognitive evaluation theory then suggests that as readers are engaged, competence grows and

reading remains motivating even in the absence of an extrinsic reward (Deci & Ryan, 1985). Ultimately, however, it is social constructivist theory (Vygotsky, 1978) and the theoretical framework for reading engagement (Alvermann & Guthrie, 1993; Guthrie & Wigfield, 1997) that explain how intrinsic motivation develops. Both constructs contend that having opportunities to choose, read, and talk about text will nurture engaged readers. Engaged readers are those who read for inherent pleasure and use strategies to construct meaning successfully.

Despite these intersections of theoretical constructs related to reading motivation and rewards, it remains unclear how to reward readers in ways that will nurture intrinsic motivation. Little is known about the effect of rewards related to literacy versus to those not related to literacy on intrinsic reading motivation. Also in question is the effect of reward choice on intrinsic reading motivation. Consequently, this study investigated the effect of differentiated extrinsic rewards (literacy and nonliteracy) and choice of reward on the intrinsic motivation to read in third-grade students.

Significance of the Study

The significance of this study relates to a number of observations made in the literature over the last decade. DeFord (1985) noted that although teachers have difficulty describing a theoretical orientation to reading instruction, their classroom practices reflect certain beliefs about how children learn and hone their literacy strategies. In addition to demonstrating a belief system about reading instruction, studies indicate that teachers use incentive programs in their classrooms. Fawson and Moore (1999) surveyed five diverse public school districts in a U.S. southwestern metropolitan area and found that 95 percent of elementary teachers conducted some variation of a reading incentive program in their classrooms. The establishment of reading incentive programs could result from teachers'

awareness and concern that reading motivation declines as children progress through school (Anderson, Tolleson, & Gilbert, 1985; McKenna, Ellsworth, & Kear, 1995). In other words, elementary teachers appear to be concerned about the reading motivation of their students and are designing and implementing reading incentive programs in accordance with their belief systems about reading instruction. Depending on the teacher's belief system, an incentive program could range from literature discussion groups with the teacher at recess (an extrinsic nontangible reward) to public displays of the number of books read and later rewards of food (an extrinsic tangible reward). According to Kohn (1994), there is not a great deal of evidence that teachers differentiate reward programs based on existing motivation, reading ability of students, grade level, or gender.

Research seems to suggest that teachers have designed or purchased reading motivation programs that offer rewards (Cameron & Pierce, 1994; Fawson & Moore, 1999; Flora & Flora, 1999). The present study was designed to empirically investigate the effect of literacy and nonliteracy rewards and choice of reward on the reading motivation of average readers in third-grade. For the purpose of this study and consistent with empirical designs of reward effects, reading motivation was defined as voluntarily returning to reading when time and other activities were provided (Deci et al., 1999). This information should be helpful to teachers as they consider the type of rewards and reward choices offered in their literacy programs and in commercially prepared incentive programs.

Research Questions

Questions about the effects of rewards on intrinsic motivation revolve around several issues (Cameron & Pierce, 1994; Lepper, et al., 1973; Lepper & Cordova, 1992; Rigby et. al., 1992). These issues include (a) the effect of rewards on the motivation to read, (b) the type of

reward offered, (c) the conditions under which the reward is given, and (d) the proximity of the reward to the desired behavior (Gambrell, 1996).

This study investigated how two independent variables—reward proximity and choice of reward—affected the intrinsic motivation to read. In this study, there were five treatment conditions with respect to type of reward and choice of reward: book/choice, book/no choice, token/choice, token/no choice, and control (no reward/no choice). The following research questions were investigated in this empirical study.

Proximity of Reward

1. How does the proximity of the reward affect intrinsic motivation to read?

Choice of Reward

2. How does choice of reward affect intrinsic motivation to read?

Definition of Terms

The following definitions are pertinent to this investigation:

Choice: the preferential expression for one alternative over another. In cognitive studies, choice is measured in terms of the percentage of people expressing a preference for one hypothetical alternative (prospect) over another. In behavioral terms, choice is measured by the ratio of responses by a subject on one manipulation to responses by that subject on another manipulation during an experimental session (Rachlin et al., 1986). In the present study, choice was defined as choice of reward.

Experimental activity: The cause-and-effect relationship studied during which the researcher manipulates one or more independent variables and determines whether the manipulations cause an outcome (McMillan & Schumacher, 1989). In the present study, the experimental activity was the reading behavior that caused the subjects to be rewarded.

Extrinsic motivation: defined in relation to reinforcement and rewards extrinsic motivation refers to performance of an activity because it leads to an external reward (i.e., status, approval, and money) (Deci, 1972).

Free-choice period: in reward-contingency studies, the time spent engaging in an activity for which a reward/control has been offered when other choices are available (Deci et al., 1999).

Intrinsic motivation: defined in relation to reinforcement and rewards, intrinsic motivation refers to performance of an activity for no apparent extrinsic reward except the activity itself (Deci, 1972).

Literacy reward: a reward that is proximal to reading and reading-related behaviors, including a book, bookmark, journal, etc. In the present study, the literacy reward was a book.

Nonliteracy reward: a reward that is not proximal to reading and reading-related behaviors, including toys, food, etc. In the present study, the nonliteracy reward was a token such as a friendship bracelet, Nerf ball, or key ring.

Proximity: the state of being close in time, space, order, or meaning. In this study, proximity is used to describe how closely related in meaning the reward is to the desired behavior. Specifically, the literacy reward is considered more proximal to the desired behavior of reading than the nonliteracy reward.

Reinforcement: embedded in the larger behavioral concept of positively reinforcing consequences (Bandura, 1969). When a given response is followed by a positive consequence, it increases the likelihood that the response will be repeated on subsequent occasions. A reinforcer is an event that increases the frequency of the behavior that follows. Although there is little dispute about the validity of the

empirical principle of reinforcement, numerous alternative explanations have been proposed to explain the manner in which reinforcement produces its effects (Hilgard & Bower, 1966; Skinner, 1953; Watson, 1913).

Reward: generally defined by its effects on behavior, rewards are stimuli that are assumed to be positive events (Cameron & Pierce, 1994). Deci (1975) makes the case that rewards can be either extrinsic or intrinsic. An extrinsic reward is the receipt of something tangible (e.g., money, token, verbal praise, status) for the performance of an activity. An intrinsic reward is the performance of an activity as it relates to the need for feelings of competence and self-determination (Deci, 1975). The present study used literacy and nonliteracy extrinsic rewards.

Self report: in reward-contingency studies, the use of a question or series of questions/statements posed to measure task interest before and/or after the experimental activity (Hidi, 2000).

Limitations of the Study

The following limitations are acknowledged for this study:

1. The sample for this study was limited to 75 third-grade students who were reading between the 30th national percentile and the 60th national percentile in total reading.
2. The sample was limited to children from four predominately suburban elementary schools in a northeastern state of the United States.
3. This study has generalizability limited to the types of reward conditions used in the experiment (choice and literacy/nonliteracy rewards). In addition, the results of the study can be generalized only to children of approximately the same age (third grade) with approximately the same levels of reading achievement. It is acknowledged that

reading motivation in younger or older readers could be influenced by factors not included in this study.

4. The distracters presented during the experimental activity, the math game and the jigsaw puzzle, limited this study. Such a limitation may have restricted the degree to which conclusions can be drawn about activity choices and a child's willingness to return to reading. In other words, other options (e.g., video games or computer activities) might reduce the number of children who returned to reading given the choices offered.
5. This study was limited by a possible testing threat to internal validity. It is possible that the mere presence of the researcher was rewarding to some children. It is also possible the researcher was biased when recording responses.

Assumptions of the Study

1. The participants will understand the experimental activity (reading to offer an opinion on possible purchases for their school library) and be willing to choose an activity during the free-choice period.
2. Returning to reading when time and choices are presented is an accurate indicator of the intrinsic motivation to read.
3. The participants will accept the presence of a researcher during all phases of the study interview, reading of a possible library book, and free-choice period.

Overview of Method

A posttest-only design with a control group was employed in this investigation. Seventy-five third-grade children who have reading levels between the 30th national

percentile and 60th national percentile in total reading were selected as participants. The study took place between September and November 2001.

Participants were randomly assigned to four treatment groups and a control group. The four treatment groups were book/choice (student selected book), book/no choice (randomly selected book), token/choice (student selected token), and token/no choice (randomly selected token). The control group was no reward/no choice.

Figure 1: Treatment Conditions

<i>Treatment 1</i>	<i>Treatment 2</i>	<i>Treatment 3</i>	<i>Treatment 4</i>	<i>Treatment 5</i>
Book/ Choice	Book/ No Choice	Token/ Choice	Token/ No Choice	No Reward/ No Choice

Specifically, the children in Treatment 1, the book/choice group, received a book of their choice as a reward. The choice was made from a box containing 25 grade- and interest-appropriate books. Children in Treatment 2, the book/no choice group, received a randomly selected book as a reward. The random selection was made from a box containing 25 grade- and interest-appropriate books. Children in Treatment 3, the token/choice received a token of their choice as a reward. The token was chosen from a box containing 15 grade- and interest-appropriate tokens. The tokens included key chains, friendship bracelets, and Nerf balls. Children in Treatment 4, the token/no choice group, received a randomly selected token as a reward. The token was chosen from a box containing 15 grade- and interest-appropriate tokens. The tokens included key chains, friendship bracelets, and Nerf balls. Children in Treatment 5, the no choice/no reward group, did not receive a reward.

Experimental Activity

In the present study, the experimental activity began with the child reading from one of six trade books. Prior to each child reading, the researcher explained the purpose of the

activity: children would be invited to choose a book from an array that were being considered for purchase in their school library and offer their opinion about the book. The researcher explained the conditions of the reward (e.g., that as a reward for reading, they would be permitted to choose a book from the box) to participants in the four treatment groups. The researcher then provided the title, author, and brief description of each book. The books selected were at a readability level 1 full year below grade level. They represented a wide variety of interests and topics; three were fiction titles and three were nonfiction titles. Each book ranged from 1,200 to 2,000 words with a mean length of approximately 1,600 words.

Free-Choice Period

After providing the book talks and reward explanation, the child chose a book and read to a designated point (approximately 250 words). Following the reading, the researcher held a brief discussion with the child regarding his/her reaction to the book. After this brief discussion, the child was given a reward based on the treatment condition; book/choice, book/no choice, token/choice, token/no choice, control (no choice/no reward).

After the child completed this phase of the experimental activity, the researcher created a diversion that caused the child to remain in the experimental room for an additional 10 minutes. During the 10-minute free-choice period the child was invited to choose an activity. The choices included a book, a jigsaw puzzle, and a math game. Unbeknownst to the child, the researcher observed and recorded the child's choice(s) and engagement.

Measures of Intrinsic Reading Motivation

Four measures of intrinsic reading motivation were obtained, three involving task persistence and one self-report. The three measures of task persistence obtained through observation during the free-choice period were: (1) first activity selected, (2) number of

seconds spent reading, and (3) number of words read. The self-report measure, asked at the conclusion of the free-choice period, was whether the child self-reported that the book or reading was the most fun thing to do in the experimental room.

In summary, this study was designed to investigate the effects of two independent variables, proximity of reward and choice of reward, on the intrinsic motivation to read. The research questions were:

1. How does the proximity of the reward affect intrinsic motivation to read?
2. How does choice of reward affect intrinsic motivation to read?

Based on the theoretical models considered for this investigation, it was predicted that the undermining effects of extrinsic rewards can be mediated by offering a reward that is proximal to the desired behavior. In other words, consistent with CET and reward proximity hypothesis, offering a book for reading should act as a signal of competence or success rather than being perceived as instrumental or controlling, and therefore, should result in sustained engagement with text. In addition, based on existing theories and research related to the role of choice in learning and motivation, it was predicted that choice of reward would enhance intrinsic motivation to read.

CHAPTER II: REVIEW OF LITERATURE

The relationship between extrinsic rewards and intrinsic motivation has been the subject of research for many decades. The results have yielded many important findings and stirred an on-going controversy. At issue is the effect of reward on intrinsic motivation. Specifically, how detrimental, if at all and under what conditions, are rewards on intrinsic motivation. The body of research generated around this question includes quantitative designs (Calder & Staw, 1975; Deci, 1971; Kruglanski, Ritter, Amitai, Shabtai, & Zaksh, 1975; McLoyd, 1979; Ryan, Mims, & Koestner, 1983) and qualitative designs (Ames, 1992; Fawson & Fawson, 1994; MacIver & Reumann, 1993-1994; Turner, 1995; Wiesendanger & Bader, 1986), as well as critical commentary (Deci, 1999; Morgan, 1981; Ryan & Deci, 2000). There is in fact such a voluminous amount of experimentation that the most recent investigative trend is the use of meta-analytic procedures (Cameron & Pierce, 1994; Deci et al., 1999; Eisenberger & Cameron, 1996; Tang & Hall, 1995; Rummel & Feinberg, 1988; Wiersma, 1992).

It is this recent body of meta-analytic research that can be used to summarize the current state of debate. Two research teams seem to epitomize the questions surrounding the relationship between rewards and intrinsic motivation. Cameron and Pierce (1994) and Eisenberger and Cameron (1996), writing from the behaviorist perspective, completed several meta-analytic investigations. They concluded that, with few exceptions, rewards do not undermine intrinsic motivation. Deci et al. (1999), a team of cognitive researchers, responded with a number of commentaries and later their own meta-analysis. Deci et al. (1999) concluded that their meta-analysis and several completed by other researchers (Rummel & Feinberg, 1988; Tang & Hall, 1995) support the undermining effect of rewards

on intrinsic motivation across a large number of activities and that such effects can be predicted based on CET.

To date, however, only a small number of studies examine the specific relationship between rewards and the intrinsic motivation to read. None of the reading reward investigations contained reward choice and type of reward as independent variables. Of the studies with reading motivation as a dependent variable, one used an empirical design that included reading interest as an independent variable, three used qualitative designs examining reading motivation within the context of the classroom, and three used survey data to comment on the conditional philanthropy associated with reading incentive programs.

Due to the limited number of reward contingency studies examining reading motivation, this literature review draws from a wide variety of investigations across several theoretical constructs to inform the experimental design used in this study. Included are reward studies from a behaviorist perspective, experimentation in overjustification hypothesis, work in CET, qualitative designs drawn from constructivist theory, and investigation in choice theory. The review informed specific aspects of the design including the definition of motivation, measuring motivation, and age of subjects.

Organization of the Literature Review

The body of research that informs reading motivation includes psychological studies in general motivation as well as several investigations of reading motivation behaviors. Psychological studies indicate that motivation and the effects of external reward on intrinsic motivation are highly complex phenomena. It does not appear to be a simple question of the impact of extrinsic rewards on intrinsic motivation. Current research indicates that a number of factors, including type of reward, design of the experiment, definition of motivation, age

of subjects, and the role of choice, must be considered when weighing the benefits or detriments of external rewards.

Based on the complexity of the literature that informs reading motivation, the review is organized into several sections. Section I discusses the theoretical models from which the literature review is drawn. Sections II-VI review the experimental literature related to extrinsic rewards and intrinsic motivation. Each of the experimental review sections contains an introduction, overview of investigations, and implications. Due to the influence of earlier studies on experimentation that followed, the studies are presented chronologically, with earlier work appearing first in the section followed by investigations that were shaped by the earlier designs and/or conclusions. Specifically, Section II considers rewards and reading motivation. Section III examines token economy research. Section IV is a review of the reward contingency studies. Section V looks at reward contingency meta-analyses. Section VI considers several studies that specifically incorporate choice as an experimental variable. Choice is considered as a separate section in the review due to the assumption in self-determination theory and CET that choice is an essential component of intrinsic motivation and has a positive effect on cognitive and affective functioning (Hidi, 2000). Section VII considers lessons learned from the literature review for designing reading reward contingency studies.

Section I: Theoretical Models Related to Extrinsic Rewards and Intrinsic Motivation

Results of 80 years of research on the effect of extrinsic rewards on intrinsic motivation are very disparate. Some studies indicate that extrinsic rewards do not undermine intrinsic motivation while others document undermining effects. Variability in the experimental findings has resulted in a number of theoretical models to explain the seemingly dichotomous nature of extrinsic and intrinsic motivation and the effects of

reward/reinforcement. The three major theoretical paradigms are behaviorism, self-perception or attribution theory, and personal causation.

The theoretical models portion of this chapter describes three theoretical models that have been used and debated as the theoretical underpinnings of reward contingency research. The first model, behaviorism, is in and of itself a psychological framework used to explain many facets of learning, including but not limited to motivation. Self-perception (overjustification hypothesis) and personal causation (CET) are both cognitive models and, although similar, contain crucial theoretical differences regarding the effect of rewards on intrinsic motivation. These three models continue to be the major theoretical constructs used to explain the enhancing and/or undermining effects of reward on intrinsic motivation.

Behaviorism (Skinner, 1953; Watson, 1913) is one of the models that explains the role of extrinsic rewards on intrinsic motivation. Some behaviorists such as Scott (1976) asserted that the concept of intrinsic motivation is obscure and, therefore, not useful when examining overt behaviors associated with rewards. Scott (1976) also contends that there is no evidence supporting an undermining effect of rewards on observable behaviors. Other behaviorists (Cameron & Pierce, 1994; Flora, 1990) claim that the undermining effects of extrinsic rewards can be explained in operant terms based on how the rewards function within the series of behaviors.

Self-perception, or attribution, theory is a second paradigm used to explain the relationship between rewards and intrinsic motivation. Several theorists, including Lepper and his colleagues (1973), looked to work done by Bem (1972) to postulate the overjustification hypothesis (deCharms 1968; Deci, 1971). The overjustification hypothesis contends that intrinsic motivation decreases after reward because the external reward overjustifies participation in an already attractive activity.

Deci (1971) referenced personal causation and the work of deCharms (1968) to offer CET as a construct to account for differences in motivation based on reward contingencies. According to CET, extrinsic rewards can undermine intrinsic motivation. The undermining effects, however, are determined by how the subject perceives the reward in light of his/her preexisting feelings of competence and/or self-determination (Deci, 1971).

Behaviorism

Behaviorism, in its most rigorous form, was proposed by John Watson (1913), the psychologist known as the “father of behaviorism.” Watson’s (1913) theory of behaviorism, known as the “empty organism theory,” assumes that nothing within the organism needs to be considered. Motivation or drive, in strictly behavioral terms, is defined as behaviors that can be directly observed. Such behaviors can be shaped or influenced by external reinforcers. Watson (1930) wrote that when a reinforcement follows a behavior, the behavior is likely to be repeated. Much research on the role of rewards has been done since this premise was offered. However, the basic question, framed in behaviorist terms, remains: Is a behavior (such as reading) likely to be repeated if a reinforcement (reward) is given?

Following Watson’s work, behaviorists went on to define behaviors and the conditions or consequences that shaped certain behaviors. These shaping conditions are known as consequences. There are two broad classes of consequences, rewarding and punishing, that serve as important determinants of behavior (Bandura, 1969; Skinner, 1953). Although behaviorists generally do not dispute the validity of the empirical principle of reinforcement, numerous explanations have been offered to explain its effects (Bandura, 1969; Skinner, 1953). These theoretical definitions of reinforcement differ in the extent to which they consider drive states, stimulus states, or response properties (Bandura, 1969; Skinner, 1953).

For example, drive-reduction theory (Hull, 1943) states that a reinforcing event is one that reduces a drive by satisfying or removing the need. Sensory-stimulation hypotheses define reinforcing behaviors as those that provide sensory stimulation to an organism (Leader, 1990). Premack (1965) defines reinforcement as the reinforcing responses rather than the reinforcing stimuli. Specifically, emphasis is placed on the nature of the reinforcing stimuli (food, money, etc.) and their efficacy under varying conditions of deprivation.

Behaviorism, as it relates directly to the effect of external rewards on intrinsic motivation, is explained by considering prior learning history and the three-term contingency relationship. The three terms are (a) discriminative stimulus or setting event, (b) the response or behavior, and (c) contingent reinforcement. Flora (1990) has suggested that all of the empirical results of the reward studies can be accounted for by considering the promised reward procedures (expected reward) as discriminative stimuli. For example, telling a subject that he/she will receive a reward is a stimulus event that precedes the operant and, as such, is a discriminative stimulus rather than a reinforcer.

From the behaviorist perspective, if actions are regulated by consequences, no loss of intrinsic motivation is expected. When individuals who are engaged in a task are reinforced for doing the task, they will spend as much time on the task as they originally did when the reinforcer is removed. Conversely, it is only when rewards function as discriminative stimuli that one might expect a decline in intrinsic motivation (Skinner, 1953). According to Cameron and Pierce (1994), although discriminative stimuli are part of the three-term contingency and affect the probability of the operant, they have very different effects than reinforcers. Task performance that occurs by promise of reward can be influenced by factors such as the subject's history with whether promised rewards were received and prior experience or exposure to the type of the reward.

According to the classical Skinnerian model (Skinner, 1953), reinforcement is the key to behavioral control. A wealth of research evidence gathered over 60 years supports the proposition that if desired behaviors are rewarded, the likelihood that those behaviors will be repeated will increase. The Skinnerian explanation for the role of reinforcement in behavioral control was widely accepted until 1971 when Deci rocked the research community by suggesting that behaviors might not be tied so inextricably to reinforcement. Deci (1971) based his contention on an empirical investigation that documented the undermining effects of reward on subsequent intrinsic motivation.

Self-Perception or Attribution Theory and Overjustification Hypothesis

Unlike some behaviorists, cognitive theorists are interested in defining and observing intrinsic motivation. In reward contingency experiments, intrinsic motivation has generally been defined as subjects returning to an activity for which they have been rewarded. Self-perception or attribution theory states that when an individual observes another person engaging in some activity, he/she infers that the other is intrinsically motivated to engage in that activity to the extent that he/she does not perceive salient, unambiguous, and sufficient extrinsic contingencies to which the behavior can be attributed (Bem, 1965; deCharms 1968; Deci, 1971; Lepper et al., 1973). Self-perception theory proposes that a person engages in similar processes of inference about his own behavior and its meaning. To the extent that the external reinforcement contingencies controlling his/her behavior are salient, unambiguous, and sufficient to explain it, the person attributes his/her behavior to these controlling circumstances (Bem, 1965; deCharms 1968; Deci, 1971; Lepper et al., 1973). However, if external contingencies are not perceived, or if they are unclear, invisible, and psychologically insufficient to account for his/her action, the person attributes the behavior to his/her own

dispositions, interest, and desires (Bem, 1965; deCharms, 1968; Deci, 1971; Lepper et al., 1973).

Overjustification hypothesis (Kelly, 1973; Lepper et al., 1973), an application of self-perception or attribution theory, is the proposition that one's intrinsic interest in an activity may be undermined if he or she is induced in an activity as an explicit means to an extrinsic goal. If the external justification provided to induce a person to engage in an activity is unnecessarily high and psychologically "oversufficient," the person might infer that his/her actions were motivated by the external contingencies, rather than by intrinsic interest in the activity. In other words, a decrease in intrinsic motivation following the withdrawal of a reward has been termed "overjustification" because it is assumed that an external reward provides overjustification for participating in already attractive activity. Lepper & Greene (1978) has suggested that extrinsic rewards lead to a decrease in intrinsic motivation when they allow perceptual shifts of causality. According to Lepper & Greene (1978), this occurs when there is sufficient initial interest in an activity, when rewards are salient, and when rewards do not increase perceived competence.

Overjustification hypothesis is formulated in terms of the perception of oneself as having undertaken an activity in order to obtain an extrinsic goal. According to Deci (1971), the nature of the extrinsic goal should be of little consequence. Thus, an overjustification effect can be predicted for any situation that results in an extrinsic attribution where previously intrinsic interest was the only salient attribution (Deci, 1971). Contracting explicitly to engage in an activity for a reward should undermine interest in the activity, even when the reward is insubstantial or merely symbolic. Conversely, overjustification hypothesis predicts that receipt of an unforeseen, unexpected reward after engaging in an

activity should have little or no detrimental effect on intrinsic motivation, even when the reward is a highly prized material one (Deci, 1971).

Deci and Ryan (1985) argue that overjustification should not be considered a theory of motivation. They contend that self-attributions may affect intrinsic motivation, but they do not see them as necessary mediators. Deci and Ryan (1980) propose CET, a framework based on a person's innate need for competence and self-determination, to explain extrinsic and intrinsic motivation.

Personal Causation and Cognitive Evaluation Theory (CET)

To integrate the results of what was becoming a very large and sometimes disparate body of research, Deci and Ryan (1980) proposed CET, which would later become incorporated into self-determination theory, a more comprehensive motivational model (Deci & Ryan, 1985). As noted earlier, CET is not a theory about rewards. In its most general form, CET argues that events that negatively affect a person's experiences of autonomy or competence diminish intrinsic motivation. Conversely, events that support perceived autonomy and competence enhance intrinsic motivation (Deci & Ryan, 1980).

CET has been definitive in its position on the relationship between rewards and intrinsic motivation. CET specifies that rewards can have two very different effects depending upon which aspect people experience as more salient. Rewards can be a vehicle for controlling behavior. To the degree that this controlling aspect of a reward is salient, CET predicts that a reward will undermine intrinsic motivation (Deci & Ryan, 1985). On the other hand, a reward can also convey information that affirms one's sense of competence. To the degree that this informational aspect of a reward is more salient, CET postulates that intrinsic motivation will be maintained or enhanced. Deci and Ryan (1980) note, however, that the

information aspect of a reward will only be salient if one feels a sense of autonomy with respect to the activity and/or its outcomes.

Due to a series of meta-analyses conducted between 1988 and 1999 revealing divergent views on the undermining effects of extrinsic rewards, Ryan and Deci (2000) further defined CET. The researchers proposed a typology of reward contingency from which they contend that predictions can be made about intrinsic motivation. Generally speaking, according to CET, positive verbal feedback tends to enhance intrinsic motivation.

Unexpected rewards and task-noncontingent rewards (a reward given for participating in the study) will not undermine intrinsic motivation. Engagement-contingent rewards (reward given for engaging in but not completing a task) are predicted to decrease intrinsic motivation significantly. Completion-contingent rewards (reward given for completing a task), according to CET, could enhance or undermine intrinsic motivation depending upon how it is perceived. Task-contingent rewards (reward given for doing or completing a task) are predicted to undermine intrinsic motivation. Finally, performance-contingent rewards (reward given for performing a task to a standard) can also have enhancing or undermining consequences. According to CET, if the performance-contingent reward is seen as affirming competence, it will enhance motivation. However, if the reward is perceived as controlling, intrinsic motivation will be undermined (Ryan & Deci, 2000).

CET, which was later incorporated as part of the larger self-determination theory (Deci & Ryan, 1985), has as its focus the conditions that diminish or enhance intrinsic motivation. In its most general form, CET argues that events that negatively affect a person's experience of autonomy or competence diminish intrinsic motivation, and events that support perceived autonomy and competence enhance intrinsic motivation.

Section II: Reading Motivation Studies

Several investigations provide data about the effects of extrinsic rewards on the specific academic motivation of reading. Two investigations are empirical studies with treatment and control groups (McLoyd, 1979; Staats, Minke, Finley, Wolf, & Brooks, 1964). Three are qualitative designs involving case study or grounded theory (Ames, 1992; MacIver & Reumann, 1993,1994; Turner 1995), and three rely exclusively on self-report survey data (Fawson & Fawson, 1994; Flora & Flora, 1999; Wiesendanger & Bader, 1986). With the exception of one survey, the subjects in all the reading motivation studies are elementary or middle school students. One survey involved college students reflecting on earlier reading incentive programs in which they had been participants (Flora and Flora, 1999).

Empirical Studies of Reading and Rewards

In 1964, Staats, Minke, Finley, Wolf, and Brooks conducted a study of reading acquisition as operant discrimination training. The experiment involved the construction of a laboratory procedure to investigate reinforcement principles in the learning of reading. Specifically, Staats et al. (1964) were interested in whether operant learning curves could be obtained for a complex task, such as reading, similar to those that had been obtained for simple behaviors.

Three 4-year-old children (two boys, one girl) who would be entering kindergarten the following semester were volunteered for the experiment by their parents. The procedure involved teaching children vowels, consonants, and words each associated with a character and reinforced using a marble token economy system. The marbles could be exchanged immediately for low value edibles or accumulated for high value toys.

The general conclusion of the experiment was that operant conditioning, when paired with a system of self-variable reinforcers backing up the token, could be used with children engaged in complex verbal learning to produce learning curves analogous to operant conditioning curves seen with more simple behaviors. Staats et al. (1964) indicated that it was possible to study reading acquisition behavior in the laboratory over long periods of time (12-30 sessions). The researchers also concluded that long-term studies of reading could be conducted with this type of experimental procedure and this type of reinforcing system.

Other researchers would study several limitations that Staats et al. (1964) pointed out in this early token economy work in the years to come. Staats et al. (1964) were concerned about teaching reading in a laboratory setting that was not naturalistic and clearly competed with the free play the children might otherwise have enjoyed in a nursery school or kindergarten setting. In addition, the perceived value of the toys was not controlled for in this study. The researchers were not sure if some reinforcers appeared more successful, causing the children to sustain longer in the experiment, because they perceived certain toys as more valuable than others. Staats et al. (1964) suggested that future studies develop a technique by which subjects would rank order toy preference.

In another empirical investigation that used storybook reading as an independent variable, McLoyd (1979) examined the effects of rewards of different value on children's interest in engaging in a high versus low-interest activity. McLoyd (1979) acknowledged earlier work in the areas of personal causation (deCharms 1968) and self-perception theory (Bem, 1972). These theoretical models suggest that extrinsic rewards decrease high intrinsic interest in an activity because, upon receipt of these rewards, the perception that one is engaging in the activity because of self-propelled interest is undermined by the perception that one is engaging in the activity because of the promise of reward. However, she also

pointed out that many researchers in the area of motivation and rewards selected only subjects who showed high initial interest in activities or tasks (McLoyd, 1979). To date, little attention had been given to the differential effects of extrinsic rewards on subjects who show high versus low initial interest in the same activity or on subjects' interest in engaging in different tasks chosen to be relatively interesting versus relatively uninteresting.

McLoyd (1979) identified two purposes for her experiment. The first was to examine how extrinsic rewards affect intrinsic interest to engage in a relatively high interest versus low-interest target activity. Secondly, she investigated the effects of the value of the reward on subsequent intrinsic interest. Researchers have employed many target activities in motivational reward studies including puzzles, drawing, etc. With few exceptions, the conclusions point to tentative educational implications of the results. The target activity chosen by McLoyd (1979) (storybook reading) was seen to have immediate academic and educational relevance. The rewards chosen for the experiment (good reader award, finger ring, animal eraser, pencil sharpener, metal washer, and a plastic peg) were based on the researcher's assumptions about the value of these rewards to children rather than empirical assessments of the value children ascribe to these rewards. McLoyd hypothesized that both high and low value rewards would decrease interest in the high interest activity. It was further hypothesized that in the high interest activity, the high value reward would result in a greater decrease in motivation to read than the low value reward.

McLoyd (1979) used a 2 (high versus low-interest activity) by 3 (high value reward, low value reward, no reward) factorial design. Her subjects were 54 second and third-grade children, 27 girls and 27 boys). Four girls and five boys were randomly assigned to three of the experimental conditions and five girls and four boys to the remaining three. The experimental activity was reading from one of six storybooks. After engaging each of the

subjects in an interest ranking of both books and rewards, the children were asked to read (based on their treatment condition and the ranking of the story book) and rewarded according to treatment condition. After engaging in the experimental activity, there was a 10-minute free-choice period. In addition to the books, the experimental room contained a Scrabble game, a book of crossword puzzles, and a math game. During the free-choice period, the experimenter moved to a corner of the room and, while pretending to be busy with paperwork, observed and recorded the activities chosen by the children. If a child read the storybook at all during the free-choice period, a bookmark was inconspicuously placed between the pages where the child left off.

McLoyd (1979) used four measures of intrinsic motivation. These were (a) number of seconds of contact with the book during the free-choice period, (b) number of words read during the free-choice period, (c) whether the first object that the child contacted during the free-choice period was the book, and (d) whether the child responded that reading the books was the most fun thing to do in the experimental room. As predicted, children who engaged in the high interest reading activity and received no reward spent significantly more time with the book than children who received either the high value reward or the low value reward. Contrary to prediction, there was no significant difference between the children in the high interest group who received the high value reward and those who received the low value reward.

Children who engaged in the high interest activity read more words than children who engaged in the low-interest activity, except those who received a high value reward. Specifically, of children who received no reward, those who engaged in the high interest activity read significantly more than those who engaged in the low-interest activity. Similarly, of children who received the low-value reward, those who engaged in the high

interest activity read more words than those who engaged in the low-interest activity. In contrast, of children who received the high value reward, those who engaged in the high interest activity read fewer words than children who engaged in the low-interest activity. However, neither of these latter differences reached statistical significance. Contrary to the prediction, there was no significant difference between children in the low-interest group who received the low value reward and those received no reward. Analyses of the frequency with which the book was the first object contacted during the free-choice period revealed no significant differences. A statically significant difference was found in favor of the high interest versus low-interest group when responding to the most fun activity in the experimental room. There was no significant difference between the reward groups on this measure.

McLoyd (1979) concluded that when amount of time and approximate number of words read were used as indices of intrinsic interest in reading a book, both high and low value rewards decreased significantly children's interest in the high interest activity compared to no reward. In contrast, high but not low value rewards increased significantly children's interest in the low-interest activity. This differential effect of rewards as a function of interest is consistent with the findings of Calder and Staw (1975). McLoyd (1979) offered several practical reflections in light of her findings. Giving children extrinsic rewards for engaging in an interesting activity, regardless of whether the reward is accorded high or low value by the children, may prove detrimental to subsequent interest. In contrast, highly valued rewards may enhance subsequent interest in a relatively uninteresting activity (McLoyd, 1979). Thus, McLoyd (1979) concluded, rather than discouraging the use of all rewards in educational settings, the discriminate use of rewards may be appropriate and beneficial.

Qualitative Studies of Reading and Rewards

Ames (1992) went on to define specific reward contingencies related to reading. She found that three types of reward conditions could enhance achievement-directed behaviors such as reading. These include (a) rewards given for student effort, (b) those based on academic progress, and, (c) those that reward meaningful aspects of performance. However, Ames (1992) cautions that even if rewards are used, motivation enhancement should not be strictly equated to quantitative changes in behavior (e.g., higher achievement, more time on task). Rather, she suggests, qualitative changes should be carefully considered. These include attributes such as ways the students view themselves in relation to a task, amount of engagement achieved in a task, and responses to reading (Ames, 1992).

MacIver and Reumann (1993-1994) make similar recommendations. They encourage practices that combine the power of specific, challenging goals with individual performance summaries that clearly indicate whether a given goal was attained or not. In addition, they suggest that a system of recognition and commendation tied to goal attainment will enhance academic motivation more than one that is not.

In a mixed methodology study of reading motivation, Turner (1995) used empirical investigation and interpretive case study to investigate willingness and effort in reading-related tasks. Three independent variables (instructional condition, task type, and gender) were empirically defined and studied. These variables were used as predictors of motivation. Elements of an interpretive case study were incorporated into Turner's (1995) investigation. Observations and interviews were conducted on a limited number of participants during a set period of time. Interview and observation protocols were based on theoretical constructs presented in the introduction. The case study data was coded and verified through member checking.

Turner (1995) found classroom tasks that "establish literacy as a higher-level cognitive ability with communication and pleasurable goals are more likely to succeed in melding literacy learning and engagement" than tasks that require rote or are perceived as low demand. In other words, rewards offered for goal-oriented, challenging reading can enhance the intrinsic motivation to continue to read.

Survey Research of Reading and Rewards

Wiesendanger and Bader (1986) conducted a small motivation survey of middle school students. They asked students to rate popular classroom techniques used to promote reading. The respondents were randomly selected and represented a variety of reading abilities. Based on the survey, the most popular rewards involved allowing students more flexibility and independence. According to the researchers, students wanted a choice. Wiesendanger and Bader (1986) suggest offering a variety of rewards and allowing students to select from an array.

Wiesendanger and Bader (1986) went on to discuss negative perceptions about rewards. While the ratings for negative rewards were consistent in all reading groups, a random sampling of students from the high- and low-achieving groups revealed that the reasons for the low rating differed. Higher ability students reported that they already like to read and that stars and names on bulletin boards wouldn't cause them to read more. Poorer readers, on the other hand, did not like the charts displayed publicly. These subjects indicated that comparison charts reinforced their negative self-concept.

In a study that examined the conditional philanthropy present in several national reading incentive programs, Fawson and Fawson (1994) recommend that incentive plans should provide rewards that connect reading or writing such as a free book or writing materials. They also suggest that incentives should be focused on those students who have

not yet developed an interest in, or understanding of, the value of reading. Lastly, they urge the designers of reading incentives to limit the duration of the program. Incentive programs should "spark an interest in reading" and then intrinsic interest should sustain future reading (Fawson & Fawson, 1994).

Flora and Flora (1999) examined the long-term effects of reading rewards in a study that surveyed college students who participated in "Book it!" programs when they were in elementary school. One hundred and seventy college students participated in the study. They responded to a variety of questions regarding their perceptions and memories of the "Book it!" program. Also investigated was whether any of the students' parents paid them to read when they were younger. The results indicate that neither being reinforced with pizza or money increased or decreased the amount the students (now in college) read nor did either reinforcer influence their intrinsic motivation to read. However, Flora and Flora (1999) note that answers to direct questions about "Book it!" participation as a child or being paid suggest that when a child is extrinsically reinforced for reading, the child will increase the amount read and enjoyment for reading. In addition, the researchers (Flora & Flora, 1999) contend that if a child does not know how to read fluently, such programs of extrinsic reinforcers may help the child to learn to read.

Flora and Flora (1999) conclude that their results provide no support for the "myth" that extrinsic rewards for reading undermine intrinsic interest in reading. Rather, they suggest, extrinsic rewards for reading set the conditions where intrinsic motivation for reading may develop. The authors contend that any concerns that reinforcement programs for reading will decrease later reading behaviors are unfounded (Flora & Flora, 1999).

Implications of Reading Motivation Studies

The results of the reading studies yield fairly consistent findings. Two of the studies examined national incentive programs (Fawson & Fawson, 1994; Flora & Flora, 1996). Only one found no undermining effects for extrinsic reading incentives. Flora and Flora (1999), in a self-report survey that interviewed college students about their “Book-it!” experience, found no support that the extrinsic reward of food undermined reading motivation, regardless of existing levels of interest. The other survey of national philanthropy (Fawson & Fawson, 1994) offered conclusions more consistent with the reading motivation experiments.

The remaining studies, all conducted with elementary or middle school readers, concluded that a variety of variables or conditions impacted the enhancing and/or undermining effects of extrinsic rewards given for reading. According to the investigations, the undermining effects of extrinsic rewards given for reading are mitigated if the rewards given (a) were for low reading motivation or low-interest in reading (McLoyd, 1979); (b) were for effort, progress, and/or meaningful performance (Ames, 1992); (c) were for attaining a challenging goal (MacIver and Reumann, 1993-1994; Turner, 1995); (d) resembled reading and/or literacy (Fawson & Fawson, 1994); and (e) involved subject choice (Wiesendanger and Bader, 1986).

Section III: Token Economy Studies

The notion that human behavior can be manipulated with rewards was born out of early behaviorist experimentation with animals. Following the general paradigms of the animal studies, initial token experiments conducted with children were designed to assess whether tokens acquired secondary reinforcing value, to see whether children's behavior could be maintained over long periods of time using token reinforcement, and to see if a

token reinforcement system could be used to train children in complex learning behaviors, such as reading.

Early token economy studies found that behaviors shaped by rewards quickly diminished in the absence of the reward. However, the complex relationship between rewards and complex learning was noted in the literature as early as 1964. Researchers (O'Leary and Drabman, 1971; Staats et al., 1964) began to wonder whether the effects of rewards could be sustained if they were paired with choice and/or verbal interactions. Experiments by Staats et al. (1964) questioned the power of perception in a token economy and O'Leary and Drabman (1971) concluded that cognitive constructs such as personal goals and attribution must be considered when designing token economy systems.

Token economy studies continued for several more years with conclusions being difficult to determine due in part to the populations chosen for the research (Staats, Staats, Schultz, & Wolf, 1962). Despite the ambiguity of the experimental results, many classrooms were quickly adopting token reinforcement systems. In 1971, a critical review of token economy studies was published. O'Leary and Drabman (1971) estimated that at least 100 classroom token reinforcement programs had been established across the country. These programs involved the systematic distribution of prizes or rewards on a frequent basis to shape learning and/or behavior (O'Leary & Drabman, 1971). O'Leary and Drabman (1971) had several objectives in their review of token reinforcement, including (a) examining widely used token reinforcement programs, (b) evaluating the effectiveness of the programs, (c) considering methodological problems associated with classroom token programs, and (d) reviewing generalization research in token programs.

Token reinforcement programs were used to shape desirable behaviors in learning and/or activity. A basic assumption in classroom token programs is that tokens will lead to

reinforcing behavior by association with a variety of backup reinforcers (food, prizes, etc.) (O'Leary & Drabman, 1971). The ingredients of a token reinforcement program include (a) a set of instructions to the class about behaviors that will be reinforced, (b) a means of making a potentially reinforcing stimulus (token) contingent upon behavior, and (c) a set of rules governing the exchange of tokens for prizes and/or special activities. Classic animal studies Kelleher (1958) demonstrated that chimps would learn tasks when tokens were exchangeable for food. Staats et al. (1964) were one of the first groups to demonstrate that a token reinforcement system could maintain the reading behavior of 4-year-old children.

It was also thought that the continual pairing of a teacher's praise with the token and backup reinforcers would result in the enhancement of the teacher's praise as a positive reinforcing stimulus. Because of the assumed enhancement of the teacher's reinforcing value and an increase in the children's academic and/or social skills, it has often been assumed that a token reinforcement system can be gradually removed without a major loss in the appropriate behavior (O'Leary & Drabman, 1971).

Token Economies to Shape Behavior

O'Leary and Drabman (1971) went on to consider the effectiveness of token programs. This evaluation considered the probability of token programs to modify four classes of behavior: (a) decrease disruptive behavior, (b) increase study behavior, (c) increase academic achievement, and (d) change other behaviors not selected as primary targets for remediation. In most of studies reviewed by O'Leary and Drabman (1971), tokens were exchanged for backup reinforcers.

Several studies examined the ability of token reinforcement programs to decrease disruptive behaviors (O'Leary and Becker, 1967; O'Leary, Becker, Evans, & Saudargas, 1969). These studies demonstrated that tokens exchanged for backup reinforcers decreased

disruptive behavior in classes for emotionally disturbed children. Disruptive children who displayed little time on task for study behavior were also the subjects of several token studies examining study behavior (Walker, Mattson, & Buckley, 1969; Broden, Hall, Dunlap, & Clark, 1970). Both of these studies found increases in the study behavior of both groups of children when a token reinforcement program was implemented.

Token Economies to Increase Academic Achievement

Studies in academic achievement yielded differing results. The academic achievement studies were also carried out with emotionally disturbed or mentally retarded students. Birnbrauer, Wolf, Kidder, and Tague (1965) found that academic accuracy increased while the token program was in place. However, error percentages increased significantly when the token program was withdrawn. Hewett, Taylor, and Artuso (1969) found that for groups of children who received tokens for a semester and withdrawal of tokens for a semester, there was significant increase in task attention following the removal of the token program. Hewett et al. (1969) were not sure what accounted for this increase. They noted, however, that this finding does support the notion that children do not become totally dependent on backup reinforcers. On the other, the researchers acknowledged, one could also conclude that task attention was suppressed during the program (Hewett et al., 1969). In other words, it is possible that certain aspects of the token program promoted attention to the mechanics of obtaining/exchanging tokens rather than on academics.

O'Leary and Drabman (1971) found changes in several behaviors not targeted in the studies. For example, increases were noted in attendance and the ability to learn the rules of exchange and bartering (O'Leary and Drabman, 1971). O'Leary and Drabman (1971) also identified several variables that appeared to influence the effectiveness of token programs. These variables were largely identified based on anecdotal evidence. The type and amount of

teacher praise, whether a teacher expected a token program to work, and the type and amount of specific feedback when providing the reinforcement were all thought to influence the effectiveness of token programs. In addition, O'Leary and Drabman (1971) indicated that, to date, no studies reported any predictors of responsiveness to token programs. However, the researchers speculated that the most obvious and possibly the most important variable in predicting changes in behavior (academic or social) is one's skill (academic or social) before entering a token program.

Concerns Regarding Token Economy Experimentation

O'Leary and Drabman (1971) raised several concerns about the experimental designs of the studies to date. The authors noted that an ABAB within-subject design was used in most studies they reviewed. This design is effective in determining the functional relationship between the token program and the children's behavior only if other reinforcers (such as teacher praise) do not rapidly become effective in reducing disruptive behaviors. Another problem with the ABAB design in classroom settings is the difficulty in determining a precise return to the base condition after the environment has been altered by the experiment. Additional methodological concerns raised by O'Leary and Drabman (1971) included lack of replication using similar dependent measures and a lack of replication using similar reinforcement schedules. O'Leary and Drabman (1971) went on to comment on the generalization of behaviors in token reinforcement programs. They noted that generalization should not be seen as a phenomenon but as a description of a behavioral change that must be programmed like any other behavior change. In fact, studies suggested (O'Leary & Drabman, 1971) that generalizations must be carefully considered along three parameters, including generalization across situations, generalization across time, or a combination of the two.

O'Leary and Drabman (1971) concluded by acknowledging that little data were available on how generalization might be achieved in token programs.

O'Leary and Drabman (1971) offered several suggestions for achieving generalization in token economy programs based on anecdotal evidence. Their recommendations dealt specifically with the populations studied in the token experiments, emotionally disruptive students and students with significant academic delays. The suggestions included (a) providing a good academic program since many behavior problems may be rooted in instructional frustration; (b) providing children with the expectation that they are capable of doing well; (c) having children help select behaviors to be reinforced; (d) teaching children to evaluate their own behavior; (e) teaching children that academic achievement will benefit them personally; (f) involving parents in the selection and reinforcement of behaviors; (g) withdrawing tokens and backup reinforcers gradually and replacing them with existing reinforcers from the classroom, such as free time and privileges; (h) reducing the discrimination between reinforced and nonreinforced situations; and (i) preparing teachers in regular classes to praise and shape behavior as special education is placed in regular academic settings.

By the early 1970s, researchers such as O'Leary and Drabman (1971) and Hewett et al. (1969) were beginning to question the effects of token economy systems on sustained learning and intrinsic motivation. O'Leary and Drabman (1971) began suggesting techniques that differentiated tangible rewards, such as pairing them with praise, to sustain the initial effects of extrinsic reinforcers. Options such as allowing children to choose their rewards or pairing rewards with verbal praise are concepts that would shortly be incorporated into CET (Deci, 1971).

Tokens as Bonuses or Bribes

A year after the review of token reinforcement programs in the classroom (O'Leary & Drabman, 1971), O'Leary, Poulos, and Devine (1972) published a discussion of whether tangible reinforcers should be viewed as bonuses or bribes. O'Leary et al. (1972) wrote in response to concerns about the reinforcers used in token economy programs. They noted that due to mistaken simplicity, most token programs that utilized tangible reinforcers misused therapeutic procedures developed within a behavioral framework. O'Leary et al. (1972) hoped that this commentary would be instructive to those who were skeptical about their use as well as to those who use tangible reinforcers too enthusiastically.

The commentary opens with several definitions of bribery followed by a discussion of the objections to tangible reinforcers. O'Leary et al. (1972) begin their discussion of concrete reinforcers by commenting that parents and school administrators frequently state that dispensing concrete reinforcers is tantamount to giving bribes. However, the researchers noted that there appears to be a considerable amount of ambiguity associated with both the definition of bribery and which tangible reinforcers are considered appropriate/inappropriate.

The professional literature includes a number of definitions of bribery, including several that define it as a gift or reward (Webster, 1958) and others that define the concept as a payment for an illegal activity (O'Leary et al., 1969). O'Leary et al. (1972) suggest that when discussing tangible reinforcers, it is important to use a definition of bribery that is consistent with that used by the dispensers of reinforcers and the public in general. They note then the primary Webster (1958) definition of bribery, related to payment for an illegal or corrupt act, is not appropriate. The secondary Webster (1958) definition, that of something that serves as an inducement or influence, is a more appropriate definition for bribery as it relates to concrete reinforcers (O'Leary et al., 1972).

O'Leary et al. (1972) acknowledge that, although the secondary definition is more accurate when describing the use of concrete reinforcers, defining token reinforcement as bribery remains a problem due to the emotional response to bribery often associated with the primary definition. O'Leary et al. (1972) suggest that those who dispense concrete reinforcers to build or shape important social, self-help, or academic skills should continually remind those who take issue with the practice that the use of such reinforcers should only be regarded as bribery in the sense that there is a definite goal of changing or shaping important behaviors. The introduction concludes with the researchers noting that there is often inconsistency between the objections teachers raise to certain reinforcers and their actual practices. For example, teachers who object to dispensing candy as tokens often use stars or stickers for the same purpose (O'Leary et al., 1972).

In addition to having strong reactions to the association of bribery with tangible reinforcers, O'Leary et al. (1972) discuss eleven additional objections regarding the use of tangible reinforcers, including not offering tokens for activities related to duty and responsibility and determining the self-satisfaction gained from a task prior to offering a reward.

Implications of Token Economy Experimentation

A number of conclusions can be drawn from the years of token economy experimentation. Although tokens are not generally seen a bribe, the studies do remind users of token reinforcement that such programs must be carefully monitored to ensure that secondary reinforcers, those most natural to the environment, replace tangible reinforcers as quickly as possible. In fact, for most children, the secondary reinforcers of praise and affection are two strong secondary reinforcers that gain influence over a child's behavior early in life. Unfortunately, due to poor learning experiences, learning difficulties, and/or

biological deficiencies, praise and affection do not acquire this reinforcing value for some children. A token reinforcement program in which tangible reinforcers are paired with social approval can be used to build reinforcers that have become effective for most people as a result of their natural environment (O'Leary et al., 1972).

Section IV: Reward Contingency Experimentation

The body of reward contingency research contains a voluminous number of investigations spanning 30 years. A sampling of this research is best discussed as a historical overview as the earlier work heavily, if not directly, influences experiments and replication that came later. The studies rely on a number of motivation models, including CET and overjustification hypotheses. Over the years, the work defines reward parameters, tests reward contingency on a number of subject populations, and studies the use of rewards in laboratory and naturalistic settings. As theories were defined and refined, the researchers periodically provided critical commentary on the learnings to date. This review mirrors these events by punctuating the experimental review with several significant commentaries.

First Experimentation in CET

In a landmark commentary and study published in 1971, Deci critically reviewed the reward literature date, found evidence for overjustification hypothesis, and began developing the tenets of CET. In his review of the theoretical constructs, Deci (1971) noted that rewards would most likely decrease intrinsic motivation. The work of deCharms (1968) in personal causation theory and Festinger's (1967) writings in cognitive dissonance were cited in support of these conclusions. Deci (1971) went on, however, to acknowledge the work of Woodworth (1918), allowing for the possibility that external rewards might, under certain conditions, enhance intrinsic motivation.

Prior to reporting on his three studies, Deci (1971) offered several summary ideas. He noted that although subhuman species studies were helpful in the study of rewards and intrinsic motivation, human data would prove more fruitful in addressing the many questions raised in motivational research. Experimentation with human subjects allow researchers to take a cognitive approach to the role of rewards on intrinsic motivation, since "humans have greater cognitive control over their own behavior and motivation" (Deci, 1971).

Second, Deci (1971) suggested that distinctions should be made among different kinds of external rewards. If, for example, a person's cognitive evaluation of different external rewards varies, then it is possible that different rewards would have differing effects on intrinsic motivation. Drawing upon this suggestion, Deci (1971) began constructing the parameters for the three experiments contained in the report.

CET: Tested With Tangible Rewards

Deci (1971) hypothesized that rewarding subjects with money and closely related tangible rewards for engaging in an intrinsically interesting task would decrease their subsequent interest in that task in the absence of such rewards. He also hypothesized that intangible, external rewards such as verbal praise would enhance intrinsic motivation. The hypotheses were tested in three experiments, two in laboratory conditions and one in the field.

In Experiment I, laboratory subjects (college students) received a monetary reward for engaging in an activity they reportedly found interesting. In Experiment II, subjects in the field (college students in a journalism class) were rewarded with money for producing headlines. In Experiment III, also under laboratory conditions, college students were rewarded with verbal praise for engaging in an activity they reportedly found interesting.

The results of Deci's (1971) studies were somewhat consistent with what has come to be known as the "overjustification hypothesis." Overjustification is the perception that one has undertaken an activity in order to receive some extrinsic goal. Subjects who had been paid, both in laboratory and field conditions, showed less intrinsic motivation toward the task than the control groups who had not been paid.

Deci's (1971) early critical review and series of three studies on the effects of externally mediated rewards on intrinsic motivation yielded several "discrepant" findings. Deci (1971) used money and verbal praise in a series of rewarding experiments with college students. As reported earlier in this review, two experiments that used money as a reward resulted in overjustification or diminished intrinsic motivation for the targeted activity. However, when verbal reinforcement and positive feedback were used, intrinsic motivation tended to increase.

Deci (1971) offered several thoughts in his discussion following the three studies. Money, he noted, because of its connotation in our culture, may have acted as a stimulus leading subjects to a cognitive reevaluation of the activity. This cognitive reevaluation was one that unmoved the subjects from being intrinsically motivated to being motivated primarily by the expectation of financial reward. The reward of social approval, on the other hand, did not seem to affect the subject's phenomenology in the same way. Deci's subjects continued to be intrinsically motivated presumably because he/she was less likely to think of affection or verbal approval as a control mechanism.

In summary, Deci (1971) acknowledged the theoretical models of personal causation (deCharms, 1968) and cognitive dissonance (Festinger, 1967) both of whom predicted a decrease in intrinsic motivation with the offer of external rewards. He also, however, noted the work of Woodworth (1918) who suggested that, regardless of the initiating motive, some

activities become intrinsically interesting. Deci (1971) suggested that no definitive answer to the question of the effects of externally mediated rewards on intrinsic motivation was available. He postulated that viewing the effects of rewards on intrinsic motivation should be considered using a cognitive, rather than a behavioral, lens. He also suggested that distinctions should be made among different kinds of rewards (Deci, 1971).

CET: Tested Using Externally Mediated Rewards

In a study published in 1972, Deci examined the tenets of CET that he hypothesized about in his conclusion to the study of the effects of externally mediated rewards on intrinsic motivation (1971). Prior to describing CRT, Deci (1972) stated that it is possible to distinguish two broad classes of motivation to perform an activity: intrinsic motivation and extrinsic motivation. According to Deci (1971), a person is intrinsically motivated if he performs an activity for no apparent reason except the activity itself. Extrinsic motivation, on the other hand, refers to the performance of an activity because it leads to external rewards (e.g., status, approval, passing grades, or gifts). The question posed in this study (Deci, 1972) was whether there would be changes in a person's intrinsic motivation for an activity when he received external rewards for performing the activity.

Deci (1971) reported that external reinforcements do effect intrinsic motivation and suggested that CET might account for the changes in intrinsic motivation following reward. CET focuses on a person's cognitive evaluation of an activity and his reasons for engaging in the activity. This theory suggests that distinctions should be made among different kinds of external rewards, because a person's evaluation of rewards can be different.

In 1972, Deci continued his investigation of the differences between money and verbal praise as rewards. He predicted, based on cognitive evaluation, that when a person performs an intrinsically motivated task for money, his perception of the reason for

performing the task shifts from being intrinsically motivated to being motivated by the money. Deci (1972) also investigated the role of verbal reinforcement on the performance of activities that were intrinsically motivating and tested inequity theory (Adams, 1963) to ascertain whether an increase in performance would result if a person felt inequitably overpaid for an activity that was intrinsically motivating.

Deci (1972) offered three hypotheses for the experiment conducted. He hypothesized that (a) when a person is rewarded with money for performing an intrinsically motivated activity, intrinsic motivation decreases, (b) when a person is rewarded with verbal reinforcements for performing an intrinsically motivated activity, intrinsic motivation increases, and, (c) when a person who is performing an intrinsically motivated activity feels inequitably overpaid performance increases.

The subjects in Deci's (1972) study were 96 undergraduate students. The experimental condition was the assembly of a puzzle. The 96 students, half male and half female, were randomly assigned to one of six conditions: (a) not rewarded, (b) rewarded with money before the free-choice period, (c) rewarded with money after the free-choice period, or (d), (e), and (f) verbally rewarded in combination with one of the first three conditions. The puzzle was pretested prior to the experiment and found to be intrinsically motivating for the subjects. Subjects were given 8 minutes of free choice, during which observations were made on the amount of time they spent working on the puzzle.

The results of the experiment gave strong support to CET, but also yielded a few unexpected results (Deci, 1972). The results for the groups that received money for task completion were highly significant, lending strong support for Hypotheses I and III. When the subjects were rewarded with money for completing the puzzle, intrinsic motivation was significantly reduced. In addition, when the subjects viewed their monetary compensation to

be inequitable in relation to the task completed, performance on the task was significantly increased. The results for the groups receiving verbal reinforcement were in the predicted direction but did not reach significance.

To further understand this variable, Deci (1972) considered the effects of verbal reinforcements on male and female subjects separately. The results showed a marked difference between the two groups. Males who received no verbal reinforcement spent less free-choice time working on the puzzles than did females. Verbal reinforcement increased the males' intrinsic motivation but left the females unchanged. In other words, no gender differences were found for Hypotheses I and II. However, Hypotheses II was supported only for males (Deci, 1972).

Deci (1972) acknowledged that the effects of verbal reinforcement on intrinsic motivation are more complicated than originally hypothesized. He noted that there appear to be two aspects to any external reward, a controlling aspect and an information aspect. The controlling aspect, in this experiment money, decreased intrinsic motivation by changing the perceived locus of causality. The continued logic related to these statements, however, was not entirely supported by Deci's (1972) results. If verbal reinforcement was perceived as informational, thereby increasing the subjects' sense of competence and self-determination, significance should have been seen for both gender groups. This was not the case. Deci's (1972) results suggested that verbal feedback was perceived by the female subjects as more controlling than informational. Deci (1972) explained the differences in light of the gender and physical attractiveness of the male graduate student conducting the experiment. He hypothesized that the female subjects found their interaction with the graduate student rewarding and the verbal reinforcement was, therefore, cognitively indistinguishable from the intrinsic feelings derived from engaging in an interesting activity. In other words, the

strength (and the subject's perception) of verbal reinforcement appeared to determine its effects on intrinsic motivation.

Deci (1972) went on to speculate that the relationship between verbal reinforcement and intrinsic motivation might be an inverted-U relationship. That is, verbal reinforcement may increase intrinsic motivation up to a point, and then it may decrease intrinsic motivation. Deci (1972) recommended further investigation regarding the type and amount of verbal reinforcement offered and differences in intrinsic motivation after reward in males and females.

Defining the Parameters of Overjustification

Lepper and colleagues (1973) continued to investigate overjustification theory in an educational setting. Their empirical investigation focused on several "contractual" techniques being used regularly in classrooms—grades, stickers, and the use of token economies (children are offered redeemable tokens for desired behaviors). Demonstrating an overjustification effect in an educational setting, they hypothesized, "would suggest the need for greater attention to the possible side effects and long-term consequences of powerful systems of extrinsic rewards."

Lepper et al. (1973) tested Deci's (1971) overjustification hypothesis in a field experiment. Specifically, they investigated the premise suggested in self-perception theory that a person's intrinsic interest in an activity can be decreased by inducing him or her to engage in that activity as an explicit means to some extrinsic goal. If the external justification provided to induce a person to engage in an activity is unnecessarily high and psychologically oversufficient, the person might infer that his or her actions were motivated by external contingencies rather than by an intrinsic interest in the activity. In other words, a person induced to undertake an inherently desirable activity as a means to an end would

cease to see the activity as an end in itself. An overjustification effect, as described by Deci (1971), can be predicted for any situation that results in extrinsic attribution where previously intrinsic interest was the only salient attribution. Contracting explicitly to engage in an activity for a reward should undermine interest in the activity, even when the reward is symbolic. Conversely, receipt of an unforeseen, unexpected reward after engaging in an activity should have little or no detrimental effect, even when the reward is highly prized.

Lepper et al. (1973) conducted the field study with preschool children who were blocked by degree on initial interest in an activity and randomly assigned to one of three treatment conditions (18 each in the expected- and unexpected-award condition, 15 in the no-award control group). In the expected-award condition, subjects agreed to engage in a drawing activity to obtain an extrinsic reward—a certificate with a gold seal and ribbon. In the unexpected-award condition, subjects engaged in the same activity and received the same award but had no knowledge of the reward until after they had finished the activity. In the no-award control condition, subjects neither expected nor received the reward, but otherwise engaged in the same activity as the other two reward conditions. Children were chosen following observation in their classrooms. The 51 subjects ranged in age from 40 to 64 months.

The experimental activity was chosen to meet three criteria (Lepper et al., 1973): (a) sufficient similarity to other classroom activities, (b) sufficient attractiveness to ensure that most children would express some initial interest, and (c) amenability of the activity to some objective definition of interest. The measurement of initial interest in the drawing activity took place over three consecutive days of blind observations. Children with an inherent interest in drawing were selected to participate in the experiment. Two weeks after the subjects were randomly placed into one of three groups, the experimental procedure was

carried out. Two persons conducted each experimental session. The first experimenter brought the child to and from and stayed with the child in the experimental room. The second experimenter administered the reward (based on the treatment condition). Postexperimental observations were the same as preexperimental observations and took place 7-14 days after the last subjects completed the experiment. Children were again blindly observed for their interest in the drawing activity. Finally, the quality of the children's drawings was evaluated. The pictures drawn for the experimenter were rated on overall quality by three blind judges on a scale from 1 (very poor) to 5 (very good).

Expected Rewards with Preschoolers

As predicted (Lepper et al., 1973), children in the expected-award condition showed decreased interest in the activity after having undertaken it in order to obtain a goal that was extrinsic to the pleasure and satisfaction of drawing in its own right. In addition to exhibiting less interest, the quality of the drawings in the expected-award condition was significantly lower than in the other two groups. Children in the unexpected-award condition showed undiminished or increased interest in the activity after receiving the award unexpectedly. Children in the no-award control showed no difference in interest or quality of drawing.

Although Lepper et al. (1973) found that it was possible to produce overjustification—that is, children showed less interest in drawing after receiving an expected reward—they noted several important cautions. They commented that the present experiment does not speak to situations that depart greatly from the present experiment—preschoolers and drawing. In addition, the researchers acknowledged considerable evidence from token-economy systems (Fargo, 1970; O'Leary & Drabman, 1971) that supported the use of extrinsic rewards in very specific situations. For example, extrinsic rewards should be particularly useful when (a) the reward is unexpected; (b) the level of initial interest is low

and such a device is essential to produce involvement in the task; or (c) the activity is one whose attractiveness becomes apparent only through engaging in it for a long time or only after some minimal level of mastery has been attained.

Salience of Reward with Preschoolers

Ross (1975) conducted a motivational reward study derived from attribution theory. Attribution theory does not concern itself with the actual cause of behavior but with the perception of cause. Research on attribution theory does not ask whether a behavior is intrinsically or extrinsically motivated. Rather it delves into the subject's perceptions of the causes of his or her behavior. For example, it is assumed that subjects who attribute their behavior to external consequences will act out of extrinsic motivation. Similarly, it is assumed that those who perceive themselves performing an activity for its own sake are intrinsically motivated.

Attribution theory also speaks to the role of rewards and motivation (Ross, 1975). Bem (1972) suggested that subjects who are provided with salient reward for engaging in an activity are more likely to perceive themselves as extrinsically motivated. Consequently, those who are provided with a reward for engaging in an enjoyable activity should attribute their performance, in part, to the extrinsic reward and show decreased interest in the activity in the absence of the reward. Ross (1975) investigated attribution theory in light of the saliency of rewards. Specifically, he examined the effect of varying the salience of an expected reward. It was hypothesized that a highly salient reward would induce subjects to perceive their behavior as extrinsically motivated. On the other hand, in the absence of highly salient external determinants, subjects should be more likely to attribute their behavior their own intrinsic motivation.

Ross (1975) conducted two experiments. Nursery school students were used in both studies. In Experiment 1, subjects were randomly assigned to salient and nonsalient reward conditions. The activity being rewarded was playing a drum to accompany a record. The salience of the reward was manipulated within the directions given to the subjects prior to playing the drum. In the nonsalient reward condition, children were told they would receive a prize for playing the drum. In the salient reward condition, the children were told that the prize for playing the drum was in a box that was placed directly in front of them. After playing the drum and receiving the reward, each subject was afforded the opportunity to return to the experimental activity or play with any other toy in the room. A control group received no reward.

The results suggested that the salience of the reward is an important determinant of intrinsic motivation. When the salience of the anticipated reward was increased, the subjects' subsequent interest in the activity was markedly affected. When compared to subjects who received a relatively nonsalient reward, the salient reward subjects were less likely to engage immediately in the experimental activity, played the drum for shorter a duration if they did return, and were less likely to report that the drum was the best thing about the room.

In Experiment 2, an attempt was made to directly manipulate the subjects' attention to the reward. The procedure in Experiment 2 was exactly the same as Experiment 1 except for the manner in which the reward was given. Once again, the salience of the reward was manipulated within the directions given to the subjects prior to playing the drum. In the experimental condition, children were told they would receive a prize for playing the drum. In the think-reward condition, the children were asked to think about the reward they were to receive. In the distraction condition, children were asked to think about snow while playing the drum. After playing the drum and receiving the reward, each subject was afforded the

opportunity to return to the experimental activity or play with any other toy in the room. A control group received no reward. The same measures of intrinsic motivation were used.

As hypothesized, the distraction condition yielded more interest in the target activity (playing the drum) during the free-play period, presumably because it reduced the tendency for subjects to think about the reward. The impact of the reward appeared to depend to a large extent on the subjects' cognitive orientation prior to obtaining the reward. Intrinsic interest was more likely to wane when the reward was highly salient, that is, when it was the central focus of the subject's attention (Ross, 1975).

High Interest Tasks and Rewards with Elementary Subjects

In 1975, Kruglanski et al. conducted three conceptual replication studies that investigated the relationship between the magnitude of task intrinsic rewards and the degree of intrinsic and extrinsic motivation. Kruglanski et al. (1975) based their experimental design on attribution theory. Within attribution theory, motivation toward a task is assumed to follow from an inference (attribution) made by the subject or person regarding the locus of causality for his own behavior. In these terms, attribution theory defines intrinsic motivation as self-attributed causes while extrinsic motivation is attributed to causes exogenous to the activity.

Kruglanski et al. (1975) tested two hypotheses with regard to intrinsic motivation and extrinsic rewards. The first hypothesis suggests that a negative relationship exists between the magnitude of intrinsic rewards and the degree of extrinsic motivation. The second hypothesis suggests that intrinsic motivation should vary as a positive function of the intrinsic rewards contained in an activity.

In the three studies carried out by Kruglanski et al. (1975), the subjects were solicited to perform an unspecified task for monetary pay. Forty boys and girls from grades 6 and 7

served as the subjects. The experiments took place during regular class time in the subject's school. Subjects were told that they were being asked to respond to questions about the study of language and that they would be paid to participate. In Experiment 1, the high intrinsic reward task was a verbal puzzle. The subject was presented with a list of five Hebrew words and was asked to construct the maximal number of meaningful words out of the letters on the list. A pretest indicated that children of the subjects' age and background found the task to be attractive and challenging. The low intrinsic reward task required the student to erase two Hebrew letters whenever they were encountered in a typed text. A pretest indicated that subjects' counterparts found this activity uninteresting. Subjects were required to work for 10 minutes. At the conclusion of the experiment subjects were paid. On the way out of the experimental room, subjects were asked if they wished to make a donation to a local charity.

Several measures of motivation were defined in the experiment. A measure of intrinsic motivation was inferred from the amount of time the subject spent on the task beyond the required 10 minutes. Two measures of intrinsic motivation were employed. One was the amount of pay the subject deemed adequate for the task. The other was the magnitude of the subjects' tendency to keep the fee or to donate it to charity. The results of the first experiment were consistent with the hypotheses. Subjects in the high interest condition spent more time on the activity than did their counterparts. Subjects in the high interest condition also recommended lower pay than did subjects in the low-interest reward condition. And, finally, subjects in the high interest condition donated more money, thereby exhibiting less extrinsic motivation, than did subjects in the low-interest condition.

High Interest Tasks and Rewards with College Subjects

In Experiment 2, the subjects were 40 female undergraduates who offered to participate in a research study in exchange for monetary compensation. Subjects in the high

interest reward condition sorted letters sent by teenage girls to a psychologist employed by a popular magazine. Subjects in the low-interest reward condition checked IBM cards, allegedly containing data about teenage girls, for punch errors. The subjects were asked to work for 2 hours but were told they could donate an additional hour without pay.

The results of the second experiment were also consistent with the hypotheses. Subjects in the high interest reward condition volunteered more than subjects in the low-interest reward condition. Subjects in the high interest reward condition recommended a lower pay increase for their task than did subjects in the low-interest condition.

In Experiment 3, the subjects were 40 male and female undergraduate students who volunteered to participate in a research study for money. In this experiment, the magnitude of task intrinsic motivation was operationally defined as the subjects' degree of involvement in the research. Subjects in the high intrinsic reward condition were given a meticulous explanation of the background and significance of the (fictitious) memory research in which they were about to participate. By contrast, subjects in the low intrinsic reward condition were given no introduction to the research. In addition, subjects in the high intrinsic reward condition were given feedback regarding the number of questions they answered correctly, while no feedback was given to the subjects in the low intrinsic reward condition. All subjects were, once again, given the option to donate their earnings to charity at the conclusion of the experiment.

The results of the third experiment were also consistent with the initial hypotheses. Subjects in the high intrinsic reward condition volunteered more, thus exhibiting a higher degree of intrinsic motivation as compared with the subjects in the low intrinsic reward condition. Finally, subjects in the high intrinsic reward condition once again donated more,

thus manifesting a lower degree of extrinsic motivation than subjects in the low intrinsic reward condition.

Kruglanski et al. (1975) concluded the series of experiments by finding strong support for the hypothesis that (a) the extent of intrinsic motivation varies positively and (b) the extent of extrinsic motivation varies negatively with the magnitude of task-intrinsic rewards. In their discussion, Kruglanski et al. (1975) found support for attribution theory versus other theories of motivation. For example, one could argue that the observed negative relationship between task intrinsic rewards and extrinsic motivation was derived from the equity principle (Adams, 1965). The equity principle would purport that the investment of labor is greater in a dull task than in an interesting one. However, Kruglanski et al. (1975) notes that in Experiment 2 the intrinsically rewarding task was rated as requiring greater investment and as more tiresome.

A second theoretical model that some may apply to these experiments, dissonance theory (Festinger, 1957), was also addressed by the researchers. Dissonance theory argues that a person who expects an exciting experience suffers dissonance when required to perform a dull or uninteresting task. Once again, the results of Experiment 2 argue against dissonance theory. In the second experiment, all subjects reported having volunteered because of the pay rather than the expectation of a pleasurable experience.

Kruglanski et al. (1975) found that attribution theory offered the best explanation for their results. According to this analysis, the attribution that the extrinsic pay caused one's performance of the task was lower when a plausible alternative cause, notably task interest, was present versus absent. In other words, intrinsic rewards or interest was enough to pull causal attribution away from the monetary rewards. Kruglanski et al. (1975) concluded their discussion with thoughts on the practical significance of the experiments. The researchers

were particularly interested in how their findings might impact the role of economic motivation in the world of work.

Monetary Rewards with Teenage Subjects

Kruglanski et al. (1975) also carried out two conceptual replications of an experiment using monetary payments as rewards. In their introduction, Kruglanski et al. (1975) discussed some definitional concerns in reward contingency research, specifically those put forward by Deci (1971). These researchers noted that Deci's (1971) distinction between internal and external causes for behavior could lead to conceptual difficulty. For example, although money constitutes an external object, the desire for it may be acutely internal (Kruglanski et al., 1975). Similarly, interest in a task may be internal, yet the task eliciting interest could be external to the person. The researchers explained that the exclusive identification of intrinsic motivation with internal causes and extrinsic motivation with external causes is in conflict with Deci's (1971) own finding that positive verbal feedback delivered by an external agent consistently leads to an increase in intrinsic motivation.

Kruglanski et al. (1975) suggest that an attributional conception of intrinsic motivation that avoids this dilemma rests on the distinction between the content of the activity and its incidental consequence (content-consequence relationship). Within this view, intrinsic motivation is defined by the case in which the person's self-attributed cause for an activity inheres in its content. By contrast, extrinsic motivation is defined by the case in which the person's self-attributed cause for an activity lies in the consequences thereof (Kruglanski et al., 1975)

The two experiments carried out by Kruglanski et al. (1975) were conceptual replications designed to pit against one another the two attributional analyses of task motivation described above. Specifically, a situation is created in which monetary rewards

are intrinsically motivating in the first case and extrinsically motivating (arbitrarily attached) in the second. According to the internal-external distinction described by Deci (1975) and others, monetary rewards constitute a salient situational feature external to the person, so their presence (versus absence) should suppress intrinsic motivation under both conditions. By contrast, the content-consequence distinction suggests that whenever money is inherent to the task its presence should enhance intrinsic motivation as it provides a salient intrinsic cause for task performance. On the other hand, whenever it is extrinsic to the task, the presence of money should lower intrinsic motivation.

The subjects in Experiment 1 were 48 boys, 14 and 15 years old, from a low socioeconomic background (Kruglanski et al., 1975). The experiment was conducted at several municipal youth centers. One-half of the subjects, randomly assigned to the money intrinsic condition, played a coin-toss guessing game with the experimenter. The remaining half of the subjects, assigned to the money extrinsic condition, used wooden blocks to construct a model according to pictures. Half of the subjects in the payment present condition were given money for each correct guess or construction. Subjects in the payment absent condition received points for each correct guess or construction. After receiving money or points, each subject was referred to an adjoining room and responded to a questionnaire. The questionnaire included checks on the task manipulation and items about the subject's interest in the game. Motivation was assessed based on questionnaire answers.

Kruglanski et al. (1975) reported results consistent with their hypothesis. In the money intrinsic condition, the subjects manifested a higher degree of intrinsic motivation when the payment was present versus absent. In the money extrinsic condition, the subjects manifested a lower degree of intrinsic motivation with payment than without payment.

In Experiment 2, subjects were 80 boys, ages 15 and 16, from two separate high schools. Twenty subjects were randomly allocated to four cells in a 2-by 2 design. The task variables were money intrinsic versus extrinsic and payment versus no payment. Subjects in the money intrinsic condition played a stock market game whose essence revolved around monetary profits. Subjects in the monetary extrinsic condition engaged in activities related to the stock market condition; however, the game revolved around athletics. Theoretically, such a game was unrelated to money. Subjects in the money intrinsic-payment condition were advised at the outset that they could keep the profits. Within the money extrinsic condition, the payment present subjects were advised that they would receive payment based on a predetermined number of points earned. Subjects in the money intrinsic-payment absent condition were advised that they would have to return the money earned. Within the money extrinsic-payment absent condition there was no mention of money or remuneration. After completing the game, subjects were given the opportunity to continue playing the original game or play another game. Consistent with Deci's (1971) work, the subject's preference for the same versus another game was interpreted as an index of intrinsic motivation.

Consistent with the original hypothesis, subjects in the money intrinsic conditions rated monetary payments as belonging more to their game than did subjects in the money extrinsic conditions. In addition, subjects in the money intrinsic condition displayed greater preference to continue with the same game in the payment present versus absent cases. In the money extrinsic condition, a higher proportion of subjects preferred to continue with the same game in the payment absent versus the payment present cases.

Kruglanski et al. (1975) concluded that the findings of these two experiments support the hypothesis that when money is intrinsic to a task, its presence (versus absence) enhances intrinsic motivation, whereas when it is extrinsic to the task, its presence lowers intrinsic

motivation. The researchers also concluded that their findings do not easily jibe with the internal-external motivation distinctions put forth by Deci (1971).

Interaction Between Extrinsic and Intrinsic Motivation

At the same time Kruglanski et al. (1975) were exploring extrinsic and intrinsic motivation based on attribution theory, Calder and Staw (1975) were conducting research and publishing commentary about self-perception theory and motivation. Calder and Staw (1975) hypothesized that intrinsic and extrinsic motivation do not combine additively, but rather that they interact. Up until this experiment, all previous studies of the interaction of intrinsic and extrinsic motivation used the same experimental design: an extrinsic reward is introduced to an interesting task, and some dependent variable measure of intrinsic motivation is assessed.

The purpose of the study by Calder and Staw (1975) was to test this interaction more directly by manipulating both intrinsic and extrinsic motivation as independent variables and measuring their effect on relevant dependent variables. Calder and Staw (1975) assert that since both intrinsic and extrinsic factors are manipulated independent variables, one can test the assumption of additivity versus interaction.

The basic experimental task consisted of solving 15 jigsaw puzzles. Intrinsic motivation was manipulated by having the puzzles blank for one group and colorful for the other group. Having each puzzle contain only five pieces controlled overt behavior. In addition, the subjects were also given an outline of the puzzle. The subjects then had to place a corresponding piece over the outline. The subjects were told that the researchers were interested in “cognitive information processing” and were asked to record the order in which puzzle pieces were selected.

The subjects in this experiment were 40 undergraduate males. Ten subjects were randomly assigned to four experimental conditions. Half of the subjects worked on blank puzzles and half worked on interesting puzzles. For half of the subjects, payment was never mentioned, while the other half were told that since the task would take 20-30 minutes, payment would be rendered for the time spent. For half of the subjects, the reward was equitable, salient, noncontingent, and given at the end of the task. The major dependent variable was task satisfaction. Subjects were asked to complete a questionnaire. The instrument was a 17-point scale ranging from extremely unenjoyable to extremely enjoyable.

As predicted by the self-perception hypothesis, the manipulation of intrinsic and extrinsic motivation was not additive in the effect on task satisfaction. For the low intrinsically motivating blank puzzle task, the enjoyable ratings increased with the introduction of the extrinsic monetary reward. However, for the high intrinsically motivating picture puzzle task, the enjoyable ratings decreased. An interaction was found between intrinsic and extrinsic motivation for task satisfaction. Calder and Staw (1975) note that although the present experiment demonstrated an interaction, it is unclear whether such an interaction need always be obtained. They suggest that a more prudent hypothesis might be that under some conditions, self-perception might produce an interaction between intrinsic and extrinsic motivation. Other variables that might contribute to this interaction (or lack thereof) include perception of external/internal control, perception of task performance, and how a reward is viewed (bribe versus bonus) (Calder & Staw, 1975).

Methodological Concerns About Reward Contingency Designs

In addition to their study of self-perception and motivation, Calder and Staw (1975) published a commentary that called into question several of Deci's findings (1971) with regard to the additive or interactive effects of money on motivation. In his 1971 publication,

Deci found that subjects who were paid contingent upon their task performance spent less free time on the puzzles than did unpaid controls. Deci, Cascio, and Krusell (1975) interpreted this finding as demonstrating that paid subjects lost interest in the activity. In their commentary, Calder and Staw (1975) discuss several methodological concerns about Deci's (1971) experiment. The first issue raised was the lack of performance data reported in the experiment. Calder and Staw (1975) contend that due to this lack of data, the decreased amount of free time spent on the puzzles could have been due to satiation or fatigue rather than a cognitive reevaluation of task performance.

A second ambiguity pointed out by Calder and Staw (1975) was the magnitude the reward. Since the rewards were administered contingent upon performance, no information was provided about the amount of reinforcement, which constituted the manipulated variable. A third ambiguity discussed by Calder and Staw (1975) was related to the expectancy of the reward. These researchers contend that additional experimentation is needed before one can determine if a decline in performance is produced by a decrease in intrinsic motivation as opposed to a reaction to the offer of a reward.

Calder and Staw (1975) conclude their commentary with the methodological problems of this type of research, several of which were noted by earlier researchers (Deci, 1971; Lepper et al., 1973). The methodological concerns include the difficulty in operationalizing the definition of intrinsic motivation as a dependent variable. Another issue that plagued this early research and remains problematic through the meta-analyses of the 1990s is the theoretical status of intrinsic motivation as a dependent variable. Calder and Staw (1975) note that researchers have frequently failed to maintain a distinction between intrinsic motivation as a perception and as an actual psychological state. They suggest that research should attempt to relate the self-perception of intrinsic motivation to task

performance and attitudes without making premature assumptions about the actual existence or nature of intrinsic motivation. As a result of some methodological problems outlined in Calder and Staw's critique (1975), Deci et al. (1975) offered additional data to support their original conclusions. These data included no significant differences between the amount of time spent on task experimental subjects and control subjects. Deci et al. (1975) also saw no significant differences for the amount of money earned by contingent and noncontingent subjects.

Verbal Rewards with Males and Females

Deci and his colleagues (1975) completed another experiment to test the question of rewards and gender differences. In this experiment, positive feedback increased the intrinsic motivation of males, just as it did in the original study, regardless of the gender of the experimenter providing the feedback. Females were less intrinsically motivated regardless of experimenter gender. Deci et al. (1975) suggested that for males, the positive feedback strengthened feelings of competence and self-determination. Females, who displayed less intrinsic motivation, appeared to perceive the feedback as changing their locus of control. Deci et al. (1975) attribute this finding to socialization differences in males and females in our society. The researchers contend that females are more sensitive to feedback and thus become dependent on it. Males, on the other hand, are less sensitive to feedback and view it as strengthening their feelings of competence.

Deci et al. (1975) conclude by agreeing with Calder and Staw (1975) that more research is needed regarding the difference between unexpected and noncontingent rewards. Deci et al. (1975) also agreed that more attention must be paid to improving the operational definition of intrinsic motivation.

Generalized Effects Using Naturally Occurring Rewards

The question of whether overjustification is a viable explanation for decreases in intrinsic motivation continued to be investigated. Principles from attribution theory (Freedman, Carlsmith, Merrill, Sears, 1974) and self-perception theory (Bem, 1972), taken together, suggest that intrinsic interest in an activity may be decreased by inducing a person to engage in that activity as an explicit means to an extrinsic goal. This proposition, termed the overjustification hypothesis, was offered and examined by Lepper and colleagues (1973). A 1973 study by Lepper and several studies by Deci and colleagues (1971, 1975) appeared to support the hypothesis. However, Ross' work in 1975 demonstrated that anticipated rewards would not undermine intrinsic motivation if they were not salient to subjects.

In 1975, Lepper and Greene concluded that the overjustification hypothesis applied to (a) activities of at least some initial interest to a subject, (b) conditions that cause a subject to participate as a means to a salient end, and (c) measures of subsequent engagement in situations where subjects do not expect extrinsic rewards. In addition to offering these conditions that might predict overjustification, Greene, Sternberg, and Lepper (1976) noted that an important question not yet answered was the relevance of overjustification to the systematic use of tangible reinforcement in applied settings. Specifically, the researchers proposed that a proper test of the relevance of the overjustification hypothesis to token economies required a between-groups design and an experimental setting in which time spent with a target activity could reasonably be attributed to intrinsic motivation.

This kind of setting was created in two elementary classrooms by providing a time of day during which the entire class would participate in a set of four activities with a common focus. Within the set, individual children were free to choose which activities they would engage in. As long as no differential contingencies were imposed on the activities, it was

presumed that an individual's relative intrinsic interest in a particular activity was reflected in the time spent engaging in it. The dependent measure, then, was the amount of time spent playing with a particular activity. Given this situation, it was possible to introduce and later withdraw a system of reinforcement contingencies and to observe the effects on children's immediate and subsequent interest in the various activities (Greene et al., 1976).

Forty-four elementary students were randomly assigned to three treatment groups and a control group. The target activities were exercises pertaining to mathematics. The three treatment groups included rewarding students for activities observed to be of high interest, rewarding students for activities that were observed to be of low-interest, rewarding a group that could choose their activities, and a control group that received no reward. After the treatment period of contingency rewards, the rewards were withdrawn and observations were completed of interest in the four mathematics activities.

After the differential reinforcement was withdrawn, subjects in two of the three groups spent significantly less time with their target activities than control subjects. Overjustification was seen in these two groups. The choice group did not demonstrate overjustification. Greene et al. (1976) suggested that strategies for achieving generalization of treatment effects should focus on subjects' cognitions regarding their reasons for engaging in target behaviors rather than strategies that focus on programming. In line with this reasoning, generalization to nonprogrammed settings is more likely to occur when training induces subjects to make endogenous rather than exogenous attributions about their reasons for engaging in a target behavior. Examples of such procedures are (a) the use of minimal and naturally available rather than overly powerful and arbitrary reinforcers, (b) the use of various fading techniques in which extrinsic rewards are gradually phased out, and (c) the

use of self-control and self-reinforcement techniques to replace or supplant externally imposed reinforcement programs (Greene et al., 1976).

Generalized Effects Using Verbal Praise as Reward

Anderson, Manoogian, and Reznick (1976) also investigated the overjustification hypothesis. A two-phase field experiment was conducted with lower socioeconomic preschool children. Children showing high intrinsic motivation on a target activity (i.e., free drawing with markers) were exposed to one of six conditions. These conditions included rewards (money, symbolic reward, or verbal reinforcement) and three control procedures (experimenter was present but ignored the child, experimenter was present and attentive, and a time control).

Money and awards, expected to be perceived as sufficient to justify performance, reduced subsequent intrinsic motivation during a free-play period. Positive verbal reinforcement, predicted to be insufficient to justify performance, resulted in increased intrinsic motivation. Intrinsic motivation in the control groups for time and presence of the experimenter did not change. Unexpectedly, a large decline in intrinsic motivation occurred in the control group where children were ignored. Anderson et al. (1976) hypothesized that if preschool children were quite accustomed to the presence of pleasant, attentive adults, the experimenter's ignoring behavior may have created an unusual situation for the child. The child may have perceived the experimenter's behavior as aversive or as surveillance. If the experimenter's behavior was viewed as negative, then drawing (target activity) may begin to have negative associations. Anderson et al. (1976) recommended that researchers consider the relationship between children and experimenters. For example, since minor changes in the experimenter's behavior may result in major changes in the child's subsequent behavior, they suggest it is imperative that researchers determine the child's perception of the situation.

Such understanding would need to include perceptions about rewards as well as verbal reinforcement and/or silence (Anderson et al., 1976).

Contingent Rewards Suggested To Have Cue Value

In an attempt to draw some conclusions about self-initiated versus other-initiated learning, Condry (1977) reviewed three earlier studies (Deci, 1971; Lepper et al., 1973; and Kruglanski, Friedman, & Zeevi, 1971). Two of these (Deci, 1971, and Kruglanski et al., 1971) examined the role of rewards and intrinsic motivation in a laboratory setting. Lepper et al. (1973) was a field study completed in a nursery school. To summarize the implications of the three studies, Condry (1977) examined contingent versus noncontingent rewards, salience of the reward, and the type of reward offered.

Condry (1977) concluded that a decrement in interest occurs primarily when rewards are contingent upon performance and that contingent awards that have “cue value” (i.e., that signal competence in the task) often enhance motivation in success but not failure conditions. Condry also noted that the more salient the reward, the more undermining it would be, thereby eroding intrinsic motivation. Finally, Condry (1977) examined the type of reward offered in the three studies. When considering extrinsic rewards and feedback, the crucial variable appears to be the degree to which the person freely chooses (as compared to feeling forced to choose) a course of action and the feedback received as a consequence. In summary, Condry (1977) concluded that a variety of anticipated, salient, positive incentives (the primary independent variable in the studies) and some additional task extrinsic conditions (i.e., surveillance, threats) lower subsequent interest in a task when compared to conditions in which no task-extrinsic incentives are available. The fact that the same incentives given after the performance of the task (and unanticipated by the subjects)

produces no such undermining effect suggests that it is the context created by the offer of rewards and not the rewards themselves that is responsible for the undermining findings.

Conclusions Questioned in Reward Contingency Studies

In another critical review of the research, Bates (1979) examined a number of reward system studies in light of four theoretical models of motivation: behavioral contrast, self-perception theory, the overjustification hypothesis, and personal causation. Bates (1979) grouped the studies according to the independent variables (reward systems) that demonstrated the greatest subsequent effects on motivation.

According to Bates (1979), behavioral contrast is requesting subjects to perform a task judged to be interesting by the experimenter. For their participation, subjects are then presented with some tangible reward (e.g., money, tokens, symbolic awards). Either immediately after reinforcement or at some later time, subjects are permitted to interact with the experimental task in a free-choice mode. The amount of time the subjects spend on the task is compared either with time similarly spent by a nonrewarded control group or with time spent by the subjects themselves in a pretreatment free-choice period.

Self-perception theory posits that motivation is a product of response patterns learned through acculturation (Bates, 1979). That is, humans learn through experience that other humans engage in activities that are, to a degree, dependent on expected outcomes or pay-offs. Self-perception theory predicts that being rewarded for a task one finds motivating will decrease the probability of future task participation if the reward is withdrawn. This will occur, according to self-perception theory, because individuals experience a shift in the perceived locus of control from the original intrinsic motivation to extrinsic rewards.

Overjustification hypothesis is an outgrowth of self-perception theory (Bates, 1979). Overjustification hypothesis predicts that the intrinsic interest of individuals in an activity

will be undermined by inducing them to engage in that activity as an explicit means to an extrinsic goal. Finally, Bates (1979) suggested that intrinsic motivation may be distinguished from extrinsic motivation by feelings of personal causation. Individuals who derive satisfaction from having accomplished something through individual effort will perceive themselves to be the origin of their behavior. This perception of personal causation will foster high levels of intrinsic motivation. Alternatively, individuals who primarily derive satisfaction from rewards will perceive themselves controlled by external contingencies. This perception will foster high levels of extrinsic motivation.

Bates (1979) reviewed studies based on the reward systems: participation-contingent, task-contingent, and social rewards. Although Bates (1979) acknowledges that general trends resulted in detrimental effects of participation-contingent and task-inherent rewards on intrinsic motivation, he warns that both theoretical and methodological discrepancies across the experiments cast doubt on subsequent conclusions. Methodological concerns include a lack of independent observations, conclusions drawn from marginal results, and a lack of control for discrimination learning. In addition, Bates (1979) asserts the single most confounding concern is the failure of researchers to commonly define the dependent measure of intrinsic motivation. He noted, for example, that the dependent variable has been defined as the relative proportion of time allotted to an activity, the quantity of task performance, the subjects' appraisal of the task's motivating properties, or some combination of these and other potential variables. Bates (1979) concluded that teachers who routinely dispense rewards for all manner of classroom activities would be well advised to look elsewhere for methods to enhance motivation and learning.

Performance Quality Investigated as a Variable

One aspect of reward contingency that had not been directly examined was the possible confounding of material reward with positive feedback about performance quality. In a 1979 study, Harackiewicz investigated this relationship in a high school setting. Her 93 subjects were randomly assigned to six experimental conditions: reward-no feedback, task contingent-no feedback, no reward-positive feedback, task contingent-positive feedback, performance contingent, and positive feedback. A performance-contingent reward with performance norms supplied at the outset of the task conveyed no additional information concerning competence beyond that inherent in the norms. A performance-contingent reward with no prior norms established would provide information concerning competence. These two performance-contingent rewards were compared to task-contingent rewards and the control condition. In addition, the effects of positive performance feedback relative to no feedback were examined in conditions of task-contingent and no reward. The rewards were notebooks and pens. The experimental activity involved searching for hidden pictures in puzzles.

Harackiewicz (1979) hypothesized that rewards contingent only upon participation would undermine intrinsic motivation (overjustification effect) and that rewards contingent on performance quality would produce an even greater decrement in intrinsic motivation relative to the control condition of no reward. It was also hypothesized that positive performance feedback would enhance intrinsic motivation and that this effect would be independent of reward effects. Harackiewicz (1979) used a variety of measures of intrinsic motivation, including behavioral (time spent on a task) as well as self-report instruments and attitude scales.

The results of the study reviewed strong support for the hypotheses. Performance-contingent rewards, particularly informational ones, were found to undermine subsequent intrinsic motivation more than task-contingent rewards, which produced decrements in intrinsic motivation relative to the control condition. Harackiewicz suggested that her findings support the generalizability of the overjustification effect. Reasons offered for possible generalizability included experimental replication using a different subject population (high school students versus college student or preschoolers), a different experimental activity (hidden pictures), and a different reward (notebooks and pens versus money or certificates). The enhancing effect of positive feedback was also replicated, and this effect was found to be independent of overjustification. Perhaps the most striking aspect of Harackiewicz's (1979) finding was the fact that the pattern found during the study on the measure of task enjoyment was still found 1 month after the experimental manipulation.

High Interest Tasks as a Variable

Daniel and Esser (1980) continued to investigate the effects of external rewards on intrinsic motivation. The researchers expanded the previous work (Calder & Staw, 1975; Kruglanski, 1975) that studied the presence/absence of a reward and high/low reward interest by adding task structure as third variable. Task structure refers to the manner in which a task supervisor organizes and defines worker activities and the way he or she plans the worker's role.

The study manipulated three variables in a 2 (reward: present or absent) x 2 (high or low task interest) x 2 (high or low task structure) factorial design. Specifically, the experiment tested two hypotheses: (a) An interaction between task interest and reward was predicted such that extrinsic rewards would enhance intrinsic motivation on the low-interest task but undermine intrinsic motivation on the high-interest task, and (b) an interaction

between task structure and reward was predicted such that external rewards would enhance intrinsic motivation in the high-structure condition but undermine intrinsic motivation in the low-structure condition. A secondary purpose of the study was to investigate the relationship among more commonly employed measures of intrinsic motivation.

The subjects in Daniel and Esser's (1980) study were 64 undergraduate psychology students. Five females and three males were randomly assigned to each of the eight experimental conditions using a randomized-blocks design. The experimental task was assembling puzzles. After completing the initial puzzles, the subjects were asked to remain in the experimental room alone. Magazines, additional puzzles, and a current university newspaper were available.

Three independent variables were manipulated in the study. Reward/no reward was the receipt, or not, of a monetary reward. High/low-interest involved manipulation of the puzzles used during the experiment. High interest puzzles were defined as those made from color photographs. Low-interest puzzles were of a solid, bland color with no pictures. Task structure was manipulated by how the instructors dealt with subjects. In the high-task structure condition, the instructors provided subjects with explicit direction for assembling the puzzle. After the subjects read the directions silently, the instructor read them aloud. In the low task structure condition, subjects were given less detailed directions and the directions were not read aloud. Surveillance by the instructors was held constant for all subjects (Daniel & Esser, 1980).

The major dependent variable during the experiment was intrinsic motivation to assemble the puzzle. Intrinsic motivation was measured by three procedures: (a) a behavioral measure consisting of the amount of free time spent on the task, (b) a task rating instrument completed by the subjects, and (c) a questionnaire measuring the subject's willingness to take

part in a similar study. An additional dependent variable was task performance. Performance was measured by the amount of time that it took the subjects to complete the puzzles.

The results of the performance analysis indicated that the presence of a contingent monetary award increased performance speed in all conditions. The results of the analysis on the behavioral measure of intrinsic interest indicated that subjects in the high interest condition spent more free time on the task than subjects in the low-interest condition. Subjects in the reward condition spent less free time on the task than subjects in the no-reward condition. Subjects in the low structure condition who received the reward spent less free time on their task than low structure subjects who received no reward. Subjects in the high structure condition, however, were not affected by the presence of a reward (Daniel & Esser, 1980).

As predicted, based on the analysis of the questionnaire, rewards undermined intrinsic motivation for tasks of high interest and/or low structure. Contrary to the hypothesis, rewards did not enhance intrinsic motivation for tasks of low-interest and/or high structure. No significant differences were found on any other measures of task difficulty. Finally, the analysis of the questions pertaining to a willingness to participate in another study revealed that subjects in the low structure condition who received a reward were less willing to participate, whereas subjects in the high structure condition were more willing to participate again if they had been rewarded. These findings supported the prediction that rewards undermine intrinsic motivation in tasks of low structure and the prediction of rewards enhancing intrinsic motivation in tasks of high structure (Daniel & Esser, 1980).

In summary, the findings of Daniel and Esser's study (1980) demonstrated that reward did undermine intrinsic motivation for high interest tasks. No support was found for the latter half of the initial hypothesis stating that rewards would enhance motivation for low-

interest tasks. The researcher's second hypothesis stated that rewards would undermine intrinsic motivation on low structure tasks and enhance motivation on high structure tasks. As predicted, each of the measures of intrinsic motivation was significantly decreased when contingent rewards were administered to subjects in the low structure condition. High task structure, on the other hand, seemed to prevent the undermining effects of rewards.

The findings from Daniel and Esser's (1980) research indicate that the undermining effects of rewards are restricted to tasks of high interest and low structure. The authors suggest that it may be possible to use structure as a "buffer" for rewards, lessening the detrimental effects of contingent rewards. It must also be noted that this study clearly indicated that rewards significantly improved performance across all conditions. Daniel and Esser (1980) stated that rewards enhance performance on relatively routine tasks but can undermine performance on more complex tasks. Daniel and Esser (1980) defined the task in their experiment as relatively routine.

The generalizability of this study seems to lie in the enjoyment a person feels completing a task and whether it is viewed as routine or complex. Daniel and Esser (1980) suggest that students be given tasks of high interest and low structure but no external inducements. What remains unanswered in this research and all to date is whether these results change if the type of reward is manipulated and how important it may be to increase performance, using rewards regardless of interest and structure.

Differences Between Attitudinal and Behavioral Measures

Morgan (1981) conducted two field study experiments that examined self-perception explanations of overjustification under reward conditions. Both experiments were based on the multiple-sufficient-causal schema (MSCS) originally proposed by Kelly (1973). This schema is assumed to be the underpinnings of self-perceptions of intrinsic and extrinsic

motivation. Morgan (1981) contends that a critical characteristic of MSCS is the discounting principle; that is, the role of a given cause in producing an effect is discounted if other plausible causes are present. The undermining effect of reward is assumed to be mediated by the discounting of intrinsic motivation following assignment of behavior to the plausible extrinsic cause, in other words, the tangible reward. Morgan (1981) acknowledged that MSCS is developmental in nature and may not be present or fully developed in young children. Therefore, in both experiments subjects were categorized according to their stages of MSCS development. The developmental stages of MSCS were additive (perception of extrinsic control adds to motivation); transitional (more than half of a population uses the discounting principle), and discounting.

In Study 1, three groups of 40 children (half male, half female), ages 5, 8, and 11, were selected and preassessed on their developmental level of MSCS schema. After being assigned a MSCS schema level, children were randomly assigned to an experimental or control condition. In both treatments, children were asked to solve puzzles as the target activity. Children in the experimental condition were rewarded after the puzzle activity with food. Children in the control condition were not rewarded. A free-choice period was then made available to each child. During the free-choice period, children could select from a variety of activities. There were several dependent variables in the study. One dependent variable, a behavioral measure, was the amount of time the child spent on the target activity when alternatives were available. A second dependent variable was an attitudinal measure. Subjects were asked to point to a circle that reflected how much they liked the target activity. The subjects were rated 1-6 depending on the circle they chose. A third dependent variable involved a judgment by the experimenter. Experimenters rated, on a scale of 1 to 9, the extent to which they judged subjects had enjoyed the task during the experimental phase.

Morgan's study (1981) attempted to relate level of functioning on the MSCS to a reaction to a concrete reward given for an intrinsically interesting task. Self-perception models would suggest an increase in interest for the additive group and a decrease for the discounting group. However, the results of Study 1 indicated significant undermining effects for all groups that received the reward as measured on the behavioral task of the amount of time spent on the target activity when others were available. In other words, no significant differences were found among the children based on MSCS schema.

The attitudinal measure also showed no significant differences. Morgan (1981) noted two possible explanations: (a) the measurement was insensitive to feelings and perception of young child, or (b) the subjects forgot the degree of liking for the task that took place. The rating of enjoyment revealed a pattern. The rewarded group received significantly higher ratings at each MSCS stage of development. Morgan (1981) noted that such a pattern revealed interesting questions. Did the rewarded subjects find the target activity more enjoyable? Or does the difference lie in the perceptions of the experimenters? In postexperiment interviews, experimenters spontaneously mentioned that they were consciously influenced by the promise of a reward. A lack of blind observers appeared to contaminate the information gleaned from the measure of the third dependent variable (Morgan, 1981).

In Study 2, Morgan (1981) attempted a more sensitive measurement of "liking" an activity to see whether undermining was present. The same MSCS schema was used to pretest subjects. However, in Study 2, attempts were made to identify all three levels of MSCS schema within one age group. A group of 8 year olds (36 male, 31 female) were pretested with the MCSC test; only additive and discounting subjects participated in the study. According to Morgan (1981), the omission of a transitional group would not alter the

experiment since the main predictors concerned the other two groups. According to the MSCS model, the additive group was expected to show an increase in intrinsic interest after the reward and the discounting group was expected to show a decrease in interest after the reward.

The experiment compared 20 subjects at each of the two MSCS stages. Half of the subjects in each group were assigned to the experimental condition, and the other half were assigned to the control condition. The experimental activity was similar to the procedure used in Study 1. There were four dependent variables in this experiment: a behavioral measure of time spent in the target activity, an attitudinal measure, an observer rating of enjoyment, and a productivity rating. The measuring operations were modified substantially in the case of the attitudinal and observer rating measures.

The measure used for liking the task was a comparison of the target activity to other activities. Specifically, subjects were asked to choose between the target activity and one of the other activities. When the choice was made, the same procedure was repeated for each of the remaining five activities. Thus, each subject received a score of 0-6, indicating the number of times the target activity was preferred to the alternative activities.

To obtain an observer's rating of a subject's enjoyment of the task during the experimental session, a teacher from an adjacent classroom entered the experimental room halfway through the session, remained there for 2 minutes and then gave a rating on a scale of 1 to 10 to describe the extent to which he or she considered the subject was enjoying the activity. The teachers were blind to the subjects' condition.

Study 1 (Morgan, 1981) revealed that the overjustification effect could exist independent of the subjects' level of development on the MSCS. The results of Study 2 indicated that, relative to the control group, the rewarded condition showed a decline in

intrinsic interest that was independent of the subjects' level of functioning on the MSCS. In his discussion, Morgan (1981) suggested that it might be more appropriate to explain overjustification in terms of socialization rather than cognitive processing. He postulated that children might, in the course of socialization, learn to associate promises of rewards with unattractive activities due to past experiences. Such past experiences are specific social situations in which adults have offered incentives to engage in what they believe will be perceived as unpleasant, difficult, or boring tasks. Ransen (1980) suggested this possibility. Ransen (1980) conceptualized this learning process as a "cognitive script," which he defined as a routinized package of information that is learned through observation of a recurring sequence of events. A critical feature of such a script is that it operates in the absence of conscious evaluation. In other words, when a child learns to associate promises of a reward with an unpleasant task, devaluation occurs without a rational, conscious assessment of the attractiveness of the task.

Both of Morgan's studies (1981) found strong behavioral effects of reward, yet attitudinal measures failed to reflect parallel outcomes. Consequently, Morgan (1981) suggested that the notion of script learning (Ransen, 1980) may provide a better explanation of overjustification effects. He noted that such an explanation relies on social learning principle rather than the cognitive development features seen on the MSCS. Morgan (1981) concluded that the cognitive language of overjustification theories should not be interpreted as conveying a conscious awareness of the intervening processes.

By 1983, research regarding the potentially undermining effects of rewards had evolved to questions surrounding the contingency variable. In all, more than two dozen published studies examined reward contingency and intrinsic motivation. Ryan et al., (1983)

reviewed these studies in an attempt to standardize the vocabulary being used to label rewards in contingency research.

Performance Contingent Rewards With and Without Feedback

Ryan et al. (1983) suggested that “task-noncontingent rewards” were rewards given to subjects for participating in an experimental session, independent of what they did in the session. They defined “task-contingent rewards” as rewards given for completion of an activity without respect to quality of performance. “Performance-contingent rewards” were defined as rewards given for a specified level of performance. Finally, Ryan et al. (1983) used the term “competitively contingent rewards” to refer to situations in which people compete directly with others for a limited number of rewards that are fewer than the number of competitors. In addition to reviewing the several dozen studies completed to date (most of which appear in this review earlier), Ryan et al. (1983) conducted an experiment designed to further investigate the controlling nature of performance-contingent rewards with and without feedback.

The hypothesis in this study (Ryan et al., 1983) stated that performance-contingent rewards would undermine intrinsic motivation relative to no-reward groups that received comparable feedback. Additionally, it was hypothesized that the controlling administration of rewards and feedback would undermine intrinsic motivation relative to the informational administration. Finally, the design included a no-reward/no-feedback control group and a no-feedback/task-contingent reward group. It was hypothesized that the task-contingent reward group would display significantly less intrinsic motivation than the informationally administered, performance-contingent group but that the task-contingent reward group would not differ from the controlled administration of the controllingly administered performance-contingent reward group.

The subjects in this study were 96 college students. The task was work on interesting hidden puzzles. One-half of the subjects were told they would receive monetary rewards and one-half were not. One-third of the subjects in each of these two groups were given an informational orientation to the activity, one-third were given a controlling orientation, and one-third were given a neutral orientation. Following the experimental activity and the administration of rewards (or not), the subjects were left alone in the experimental room for 6 minutes while their behavior was surreptitiously observed. Of interest was the amount of time the subjects spent on the target activity. At the conclusion of the observation period, subjects were asked to complete a questionnaire regarding their attitudes toward the target activity (Ryan et al., 1983).

The primary dependent measure in this experiment was the free-choice assessment of intrinsic motivation. The three major hypotheses were supported by the results of this study. The performance-contingent reward group displayed less intrinsic motivation than no-reward groups that received comparable positive feedback. In addition, the controlling feedback groups displayed less intrinsic motivation than the informational groups. It appears that informationally administered positive feedback enhances intrinsic motivation more than no feedback, whereas positive feedback administered controllingly does not result in a significant increase (Ryan et al., 1983).

Performance Contingent Rewards and Perception of Control

The third and final hypothesis compared the two types of performance-contingent rewards to task-contingent rewards. Ryan et al. (1983) found that controllingly administered performance-contingent rewards do not differ from task-contingent rewards. On the other hand, the informationally administered performance-contingent reward group showed considerably higher intrinsic motivation than the other two. The researchers also commented

on the no- reward/no-feedback group relative to the two performance-contingent reward groups. The intrinsic motivation of the no-reward/no-feedback group was midway between the two performance-contingent groups. Although neither of the differences were statistically significant, the researchers suggest that performance-contingent rewards can either increase or decrease intrinsic motivation relative to a no-reward/no-feedback condition, depending upon whether the performance-contingent rewards are informational or controlling (Ryan et al., 1983).

Performance Contingent Rewards Given in a Natural Setting

Although many studies of reward contingency had been completed, most were laboratory based and few examined reward contingency in natural settings (classrooms) in relation to the acquisition of academic skills. In 1983, Schunk conducted such an investigation. He investigated performance-based rewards by testing the hypothesis that rewards offered for performance attainments during competency development promote skill development and perceptions of self-efficacy. Schunk (1983) looked specifically at the attainment of division skills. Subjects in the study were 36 elementary school children, ages 8-11, who lacked division skills and received individual instruction and opportunities to solve division problems. One group of children (performance-contingent reward) was told they would receive points for each problem they completed and that they could exchange points for prizes. A second group (task-contingent reward) was told they would receive points for engaging in the task and that points could be exchanged for prizes. A third group (unexpected reward) were not offered prizes but unexpectedly were allowed to choose prizes at the end of the training. The posttest in this study included a division test as well as a questionnaire related to self-efficacy.

Children in the performance-contingent condition exhibited statistically significant gains in both mathematical skill and measures of self-efficacy. The results of this study provided evidence that offering performance-contingent rewards promotes children's task accomplishments, percepts of efficacy, and skills development. In contrast, offering children rewards for simply participating at a cognitive-learning task does not promote these outcomes over the results from merely providing training. Schunk (1983) concluded his discussion with thoughts about practical significance. Although Lepper and Greene (1978) suggest that engaging in a task over time should result in increased skill, Schunk (1983) noted that mere task engagement may not convey the information children need to improve their capabilities. When rewards are clearly tied to progress, Schunk (1983) points out, children receive additional information regarding skill development and capability.

Performance Contingent Rewards and Effects on Self-Efficacy

Schunk (1984) continued his investigation of skill attainment in a study that compared the effects of performance-contingent rewards and proximal goals on children's task motivation self-efficacy, and skillful performance. Once again, children who were deficient in division skills received division instruction and solved problems. The subjects were 33 children, ages 9-11, drawn from two elementary schools. One treatment group was offered rewards based on their actual performance (rewards only); a second treatment group pursued proximal performance goals (goals only); and a third treatment condition received rewards and goals. Schunk (1984) found that although all three experimental treatments led to equally rapid problem solving during training, combining rewards with goals resulted in the highest self-efficacy scores and the more accurate division performance.

Reward Interest as a Variable

Attribution theory and self-perception theory (Bem, 1965) continued to be used as the theoretical model for continuing investigations of overjustification hypothesis. Self-perception theory predicts a decrease in preference for a rewarded activity when two conditions are met: internal interest in the activity is high and the reward is perceived as more than adequate justification for performance. To test this prediction, Newman and Layton (1984) carried out a 2-by-3 factorial design experiment in which baseline interest uncontaminated by external factors was measured. The external factors that Newman and Layton (1984) attempted to control included experimenter's presence, experimenter's demeanor, and the earning of experimental credit. Any or all these factors, the researchers claim, were present in other differential reward studies to date (Calder & Staw, 1975; McLoyd, 1979) and could have confounded the experimental situation.

Newman and Layton (1984) conducted baseline measures of intrinsic interest during unrequired, unsupervised, and unrewarded play with target toys. The study manipulated three levels of reward to test the self-perception prediction that a linear relationship exists between the size of external reward and the decrement in performance following the removal of the reward. Specifically, the factorial design manipulates two levels of internal interest and three levels of reward size. An additional group at both levels of internal interest provided appropriate baseline measures. Newman and Layton (1984) predicted, according to self-perception theory, that interest and reward size would interact upon a dependent measure of performance; specifically, there would be a negative linear effect of reward size for high interest groups and no effect of reward size for low-interest groups (Newman and Layton, 1984).

The participants in Newman and Layton's (1984) study were 82 public school students in first or second grade. Forty-two of the subjects were boys and 40 were girls. The independent variables were internal interest of the target activity and reward size. The two levels of internal interest were manipulated by the appeal of one target toy made available to each child. The high interest level toy was a set of multicolored plastic drinking straws, joiners, and wheels that could be built into simple or complex structures. The low-interest level toy was a four-piece wooden jigsaw puzzle designed for a 2- to 3-year old child. These toys were chosen because they had been found to be of differential interest during observations. Reward size was manipulated by the number of candies (M & Ms) given to a child. There were three levels of reward: none, small (1 M & M), and large (15 M & Ms). The dependent variable was play interest.

The independent variables were manipulated during an initial play period. During the first play period, children were presented with the high interest or low-interest toy. Varying conditions of reward were offered for the play. Following the initial play period, a second play period was conducted. During this period (5 minutes), the experimenter left the room. Before leaving, the experimenter indicated that the child could play with either of the toys on the table (target toy and a moderately interesting picture dictionary). After a 5-minute interval, the experimenter returned, spoke briefly with the child, and then escorted the child back to the classroom (Newman & Layton, 1984).

The dependent variable of play interest was measured during the second play period by observing the child through a one-way screen. The subject's behavior was observed every 5 seconds for the 5-minute period. The children were judged to be manifesting play interest when they were both touching and looking at the toy. The number of time segments (the

maximum was 60) that the subject's behavior met this criterion comprised the play interest-dependent measure (Newman & Layton, 1984).

Newman and Layton (1984) found that the occurrence of overjustification was predictable by self-perception theory. In other words, they predicted and found that children were less inclined to engage in an interesting play activity after receiving a substantial reward. When the reward was less (hence perceived as a less compelling cause for the activity) or when the target activity was less interesting (hence the original cause for the activity was not internal and not influenced by the reward), overjustification was not found (Newman and Layton, 1984).

The findings of Newman and Layton (1984) are consistent with the work of Calder and Staw (1975) and McLoyd (1979), demonstrating that the effects of rewards interact with a subject's initial interest level. However, Newman and Layton's (1984) study also suggested that the magnitude of the reward was consistently related to the occurrence of overjustification. There was a negative linear relationship between the reward size and subsequent play for children rewarded for playing with an interesting toy. No such decrement occurred for children rewarded for play with a toy of low initial appeal. In fact, there was a linear relationship between a subsequent increase in play with a low-interest toy (Newman & Layton, 1984). Newman and Layton (1984) recommended that initial interest in a target activity be carefully diagnosed prior to implementing a reward program. Rewards may help increase engagement in an activity that is considered boring. The danger of external rewards seems to lie in rewarding children for improvement in behaviors that recipients already find interesting (Newman & Layton, 1984).

A Differentiated Definition of Extrinsic Motivation

Rigby et al. (1992) suggested in a critical review of research that children can be self-motivated even when offered external rewards. The group discusses the social context within which the reward is offered—specifically that of positive feedback. Deci, a collaborator with Rigby (Rigby et al., 1992), identified three specific social contextual factors that promote intrinsic motivation. They are (a) a meaningful rationale so that the individual will understand the personal importance of the activity, (b) an acknowledgment of the person's feelings so that he or she will feel understood, and (c) an interpersonal environment that emphasizes choice rather than control. Rigby et al. (1992) concluded that with this "differentiated concept of extrinsic motivation—that which invites learners into self-determination—learning is maximized."

Verbal Embellishment as Reward

Certainly, classroom incentive practices should seek to ensure that the motivational and educational goals are mutually congruent. In conjunction with Rigby et al.'s (1992) work on the social context of verbal praise, Lepper and Cordova (1992) investigated whether the addition of "appropriately designed motivational embellishments" could increase learning and subsequent interest in the subject. A series of four studies were carried out with upper elementary aged students. The tasks involved problem-solving activities, several in a computer-based format and several using a board game. The researchers drew a number of conclusions. Each of the experiments resulted in positive effects on immediate interest, generalization of learning, and, to some degree, subsequent motivation. Specifically, Lepper and Cordova (1992) found that embellishment (verbal scaffolding, support, direction, additional information) led to more motivation, confidence, and problem solving. In addition,

embellishments were found to be more motivational than tangible rewards. The challenge, as Lepper and Cordova (1992) noted, is to match the "actions required to learn with the actions required to enjoy learning."

Implications of Reward Contingency Studies

Due to the large number of singular reward contingency experiments and the recent use of meta-analysis to examine the body of work, a number of commentaries (Hidi, 2000; Morgan, 1981) have emerged highlighting the controversies of motivational research using extrinsic rewards. The larger pedagogical debate continues to rest between behaviorist researchers (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996) and cognitive theorists supporting self-determination theory and CET (Deci, et al. 1999; Ryan & Deci, 2000).

However, when examining the reward contingency research as single studies, a number of cautions emerge for the researcher considering a motivational experiment involving extrinsic rewards. Concerns have been raised in the literature about the type of rewards offered to subjects (Hidi, 2000; Morgan, 1981). The age of subjects in motivational research has been questioned (Morgan, 1981) as has accurate assessment of initial task interest (Hidi, 2000). Finally, how motivation is measured during the experiment and the setting in which the experiment is conducted are issues seen frequently in critical commentaries of reward contingency experimentation. Each implication is briefly considered.

Type of Reward

Findings from experimental research regarding type of reward are complex. These include whether the reward is expected (Lepper et al., 1973), the social context within which the reward was offered (Rigby et al., 1992), the degree of challenge and embellishments

surrounding the reward (Lepper & Cordova, 1992; Turner, 1995), and whether the reward is given for completion of a specified level of performance (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996; Deci et al., 1999). Finally, preliminary conclusions also seem to suggest that how closely the incentive approximates the desired behavior influences intrinsic motivation.

Early token economy studies (O'Leary, 1971) began to note differing conditions under which token economies appeared to be more or less effective. O'Leary (1971) suggested that token economy systems were more effective if paired with verbal praise or when linked to a natural classroom condition or behavior. Even the early reward contingency experiments (Deci, 1971, 1972) noted the differential effects of rewards. Deci (1971) found tangible rewards to be more undermining than verbal praise. He also reported that gender differences were found with monetary rewards and verbal feedback. In the 1971 Deci study that was replicated by the researcher in 1975, only males' interest in an activity could be increased with verbal feedback. For the next two decades, motivational researchers continued defining the conditions under which rewards undermined intrinsic motivation.

In their attempt to organize the results of dozens of experiments, Ryan et al. (1983) introduced a typology of reward contingencies: verbal praise, task noncontingent (a reward for participation only); task-contingent (a reward given for completing an activity); and performance-contingent (reward given for matching or surpassing a criterion).

When considering the body of token economy and reward contingency experiments, it is generally predicted that verbal praise will enhance intrinsic motivation (Ryan & Deci, 2000). Task-noncontingent rewards do not appear to affect intrinsic motivation for that task (Lepper et al., 1973). Task-contingent rewards were found to significantly undermine extrinsic motivation (Ryan & Deci, 2000). The results for performance-contingent rewards

are mixed. Intrinsic motivation appears to be undermined in some studies (Ryan & Deci 2000) and not in others (Eisenberger & Cameron, 1998). The criteria for which the reward was given and the motivation measure appear to influence the results. For example, performance-contingent rewards appear to cause undermining (Ryan & Deci, 2000). However, when the reward was given for a specific performance (e.g., exceeding the 80th national percentile), intrinsic motivation was enhanced (Eisenberger & Cameron, 1998).

Age of Subjects

With few exceptions, reward contingency studies have used preschoolers or college students as subjects (Anderson, 1976; Daniel & Esser, 1980; Deci, 1971, 1972; Ryan, et al., 1983). It is difficult if not impossible to generalize the results of these reward contingency investigations to an elementary school population. Several studies were conducted with elementary school children. Schunck (1983) found that rewards given to 8 to 11 year olds for skillful performance and/or attaining a goal enhance intrinsic motivation. Newman and Layton (1984) concluded that substantial rewards given for interesting activities undermined intrinsic motivation. On the other hand, when the reward was less or when the target activity was less interesting, undermining was not found. Lepper and Cordova (1992) found that when verbal embellishments, verbal support, or additional information was paired with rewards, motivation was enhanced more than when tangible rewards were offered without verbal enhancement.

Evaluation of Initial Interest

A number of researchers (Sansone & Harackiewicz, 2000; Hidi, 2000) have noted that, although studies appear to evaluate the effect of rewards on individuals' intrinsic motivation, only a handful of experiments adequately assessed initial motivation

(Zimmerman, 1985; Lepper et al., 1973). In fact, as early as 1976, Arnold predicted that the level of a person's initial task interest and the levels of situational interest aroused by the given task are crucial variables in the investigation of extrinsic rewards. By not distinguishing between different types of interest, Hidi (2000) cautions that motivational researchers have neglected to consider that the effects of rewards may depend on the type of interest individuals experience.

Measures of Motivation

Several researchers (Lepper et al., 1996; Ryan & Deci, 2000) have pointed to the need for dependent measures that effectively assess intrinsic motivation. Caution is seen in the literature for both free-choice measures of motivation and self-report surveys. Free-choice measures, for example, might be contaminated by the subjects' expectation of a reward for continued engagement. Task involvement after reward has also been attributed not to the expectation of reward but to the subjects' perception that engagement is in some way pleasing to the examiner. In other words, free-choice engagement in an activity might result from a need for social approval and be unrelated to tangible rewards. Another complication in the experimental literature is that free choice is often not differentiated by immediacy of the observation period. In some studies, the reward and observation occur at the conclusion of the experiment with the experimenter in the room. In other cases, the measurement takes place weeks after the experiment with the subjects being unaware that they are being observed. Clearly, these two measures of motivation are qualitatively different.

Self-report surveys or questionnaires have also been called into question. Some surveys do not adequately define a motivation continuum, thereby requiring subjects to define their state as extrinsic or intrinsic (Harter, 1981; Ryan & Deci, 2000). Just the

opposite can be true as well. Some questionnaires are so complex that subjects, especially young children, are confused by the choices (Lepper et al., 1996).

Several researchers suggest that when arranging a reward contingency experiment, both free-choice observation and self-report measures be employed with all subjects (Morgan, 1981). In addition, many of the meta-analytic critical commentaries recommend that the measurement of the dependent variable be carefully defined and described by the researcher. Timing, conditions of reward and/or observation, and proximity of the experimenter should not be inferred by the reader (Morgan, 1981).

Experimental Setting

The generalizability of reward contingency studies has been questioned due to the lack of natural reward contingencies arranged during the experiment (Ryan & Deci, 2000). Increasingly, arbitrary reward contingencies and the nonnatural pairing of certain behaviors with reward sensations have caused researchers to doubt the experimenter's ability to observe and/or measure self-regulatory behaviors such as motivation. Included in a number of critical commentaries is concern for experimentation taking place in laboratory settings, experimental tasks that have little relationship to complex learning and rewards lacking proximity to the desired behavior (Harackiewicz, 2000; Hidi & Harackiewicz, 2000). Specifically, it is difficult if not impossible to replicate the motivational conditions of a classroom in the laboratory, which greatly limits generalizability. In addition, Hidi and Harackiewicz (2000) note that not only do many of the game-like experimental tasks (such as pinball or puzzles) lack resemblance to classroom learning, they do, in fact, have built-in motivation by providing the subject with ongoing performance feedback. Finally, most reward contingency studies are conducted with relatively simple short-term activities. Hidi

and Harackiewicz (2000) recommend caution when attempting to apply the results of experiments containing short term motivation tasks to complex educational situations.

Experimentation and the critical commentaries suggest that type of reward, age of subjects, evaluation of initial interest, measurement of motivation, and the experimental setting be carefully considered when conducting a reward contingency study. The literature suggests that the type of reward must be carefully defined, as suggested in Ryan et al.'s (1983) typology. In addition, the relationship, if any, between the proximity of the reward to the desired behavior should be studied.

Generalizability of many reward contingency experiments has also been seriously questioned due to vast differences in the ages of subjects. For many years, attempts were made to draw conclusion about the effects of rewards on academic subjects such as reading and mathematics from studies that involved either preschool or college-age subjects. Due to the now acknowledged the "developmentalness" of specific motivations (Lepper, Henderlong & Gingras 1999), it appears prudent to investigate content-specific motivation (such as reading or mathematics) using school-age subjects.

If the extrinsic rewards are carefully defined and designed to be more proximal to the desired learning behavior, it is still crucial to evaluate subjects' initial task interest. To minimize experimenter contamination, the assessment should be given weeks before the experiment and be administered by an independent recorder. To adequately define the dependent variable, the literature suggests using both a free-choice observation period and a self-report survey/questionnaire as measurements of intrinsic motivation.

Finally, many motivational researchers suggest designing reward contingency studies using as naturalistic a setting and task as possible. Discerning the real-world implications of reward research is difficult under the best of conditions. Lepper, Keavney, and Drake (1996)

suggest that although generalizations will never be simple, the reliability and validity of reward contingency research can be greatly enhanced if experimental conditions are arranged that more closely mirror the motivation parameters of complex learning. In other words, reading motivation research using extrinsic rewards should take place in a school setting utilizing an experimental task that resembles classroom/school expectations.

Section V: Reward Contingency Meta-Analyses

In the years since the publication of the first experiment calling into question the positive and/or harmless effects of reward on intrinsic motivation (Deci, 1971), the field has produced hundreds of empirical investigations, narrative reviews, and vigorous commentaries from behavioral psychologists and cognitive scientists. As a result of the large number of empirical studies (over 100 through 1999), the controversial nature of the topic, and the emergence of statistical synthesizing techniques, it is not surprising that meta-analysis would dominate reward contingency research in recent years (Cameron & Pierce, 1994; Deci et al., 1999; Eisenberger & Cameron, 1996; Tang & Hall, 1995; Rummel & Feinberg, 1988; Wiersma, 1992).

Prior to examining specific reward studies, it is the meta-analytic work done over the past 15 years that best summarizes many of the design and conclusion controversies embedded in reward contingency research. Although a number of researchers conducted meta-analyses utilizing reward contingency research, two are representative of the on-going debate between behavioral psychologists and cognitive psychologists.

Cameron and Pierce (1994), writing from the behaviorist perspective, completed a meta-analysis in 1994. The results indicated that with few exceptions, rewards do not undermine intrinsic motivation. Deci et al (1999), a team of cognitive researchers, responded with a number of commentaries and later their own meta-analysis. Deci et al. (1999)

concluded that theirs and other meta-analyses support the undermining effect of rewards on intrinsic motivation across a large number of activities and that such effects can be predicated based on CET. Unfortunately, after considering all the meta-analyses, the dichotomy is not as distinct as that portrayed by these two teams and their conclusions are limited in scope.

Meta-Analysis of CET

Rummel and Feinberg (1988) completed one of the first meta-analyses designed to examine CET and detrimental effects of rewards on intrinsic motivation. Prior to 1968, the relationship between rewards and motivation was considered to be one of the clearest links in the social sciences. As defined by the behaviorists, given a reinforcer, an individual's motivation would increase. However, findings from seminal work by deCharms (1968) and Deci (1971) showed that certain types of rewards would have differing effects on certain types of motivation. Deci (1971) proposed CET as an explanation of the specific phenomenon that some extrinsic rewards have a detrimental effect on intrinsic motivation.

Rummel and Feinberg (1988) noted that after almost two decades of research, CET remains a controversial model of rewards and motivation. While many studies support prediction based on the theory (e.g., Deci, 1975; Deci & Ryan, 1980; Kruglanski, 1975), others refute them (Farr, Vance, & McIntyre, 1977). Conflicting opinions about CET raised questions concerning the validity of the theory and/or the adequacy of its operationalizations. In an attempt to clearly identify the link between the concepts central to CET and those operational variables used to measure the concepts, Rummel and Feinberg (1988) analyzed 45 studies.

Prior to examining the results, it is crucial to note how Rummel and Feinberg operationalized CET within the studies selected for the meta-analysis. Intrinsic motivation has been defined as the engagement in an activity in the absence of any external pressure. In reward motivation studies, the tasks implemented to examine intrinsic motivation have ranged from manipulating a Soma puzzle (Deci, 1971) to drawing pictures with a marker (Lepper et al., 1973) to word puzzling (Kruglanski et al., 1975). Rummel and Feinberg (1988) observed that few researchers have documented the potential for variability in how tasks are perceived. They suggest that tasks are one part of an information process model instead of a static set of attributes that exist in their own objective reality. Because of this potential variability in the perceptions of tasks, Rummel and Feinberg (1988) suggest it is important for researchers to validate subjects' initial perceptions of the task or to ensure appropriate perception of the task beforehand.

Rummel and Feinberg (1988) identified independent variables. Since the basic premise of CET is that extrinsic rewards have a detrimental effect on intrinsic motivation, it is necessary to establish an operationally valid extrinsic reward. The three types of extrinsic rewards most commonly seen in the studies examined included verbal feedback, some amount of cash, or a symbolic token (candy, award, etc.). The degree of subsequent interest in a task after the experimental activity is the most popular dependent variables employed in studies of CET. In addition to subsequent task interest, pencil and paper and/or verbal measures of attitude and interest have also been utilized (Rummel & Feinberg, 1988)

The 45 studies chosen for this meta-analysis were published between 1971 and 1984. Studies were included in the sample based on the following criteria: (a) the studies had to be testing the basic relationship of detrimental effects of extrinsic rewards on internal motivation, (b) the extrinsic reward had to be operationalized in such a manner as to convey

controlling information to the subject based on Deci's (1980) definition of extrinsic reward, and (c) results had to be sufficient to calculate effect size. Studies yielded more than one effect size if (a) the study reported more than one dependent variable, (b) the study manipulated more than one type of extrinsic reward, and (c) more than one type of population was used (Rummel & Feinberg, 1988)

The meta-analysis yielded 88 effect sizes. A test of homogeneity was performed to ensure confidence in the main effect. In addition, Hedge's (1982) analogy to the analysis of variance was used. Tests were conducted to determine whether the variations between groups were significant and to test whether the remaining variation within groups of effect sizes was significant. The independent variables examined were (1) population type, (2) type of intrinsic reward, (3) type of reward, (4) dependent measures, (5) expectancy of reward, and (6) contingency of reward. In all categorical tests, the null hypothesis was not rejected, suggesting that the independent variables did not account for a significant proportion of the variance individually. In other words, a significant proportion of the variances was accounted for by the primary independent variable. Five effect sizes were negative, indicating that evidence contradicted Deci's CET.

Based on the strictly defined operational definition of extrinsic reward (that which conveys controlling information), Rummel and Feinberg (1988) found evidence for CET. Their meta-analysis concluded that extrinsic rewards could have a detrimental effect on intrinsic motivation. Particular studies were excluded from this meta-analysis because they did not satisfy Deci's (1971) definition of extrinsic reward. It could be argued, Rummel and Feinberg (1988) admit, that this set up a straw man and that studies were selected to bias toward finding the model adequate. However, the opposite could also be argued. If some of the past research failed to operationalize the essential construct according to the theoretical

model, was CET truly being tested? Rummel and Feinberg (1988) conclude that this meta-analysis lends support for CET and argue that the controversial nature of the literature related to rewards and intrinsic motivation has been created, in part, by the lack of appropriate operationalization of the theoretical model.

Meta-Analysis of Contingent Rewards and Interest

Wiersma (1992) conducted another meta-analysis examining the question of whether contingently applied extrinsic rewards decrease intrinsic motivation created by an interesting task. Wiersma (1992) included research and organizational psychology for this investigation, citing that, although the debate had been ongoing for 20 years, such a study carries important practical implications. These implications might suggest how financial rewards should be coupled with management policies, which stimulate employee's intrinsic motivation.

In an introduction related to pay and work, Wiersma (1992) noted that some theorists assumed that the effects of intrinsic and extrinsic rewards on performance were additive (Porter & Lawler, 1968), while others argued that linking extrinsic rewards to task performance could decrease intrinsic performance and thereby decrease performance (Deci, 1975). A recommendation stemming from this early research on intrinsic motivation was that pay-for-performance salary systems not be used with job enrichment or participative decision making because the performance-contingent extrinsic rewards would reduce the intrinsic motivation created by more challenging, self-generated work procedures. Rather, it was suggested that organizations pay employees equitable salaries, not tied to performance, so as to attract and ensure participation, and to rely more in intrinsic motivation techniques to improve performance (Wiersma, 1992). Subsequent findings, however, remained mixed.

Like other researchers who attempted to critically analyze content reward research or undertake a meta-analysis, Wiersma (1992) acknowledged difficulty arriving at a consistent

definition of intrinsic motivation. Some studies, he noted, measured task behavior during a free-time period while others examined task performance as the measure of intrinsic motivation. For this meta-analysis, Wiersma (1992) proposed that differences in study findings can be attributed to differences in the behavioral operationalizations of the construct of intrinsic motivation. Based on previous findings, Wiersma (1992) predicted that the overjustification effect in which extrinsic financial rewards reduce intrinsic motivation, as predicted by CET, will be more prevalent when intrinsic motivation is operationalized as task behavior during a free period than when it is operationalized as task performance while the extrinsic reward is simultaneously in effect.

Wiersma (1992) examined 20 studies that used behavioral measures to directly assess the impact of extrinsic rewards on intrinsic motivation directly. The following variables were assessed for each study: sample size, extrinsic reward comparison, type of dependent measure used, difference between the experimental and control groups means, standard deviation of the control group, and effect size.

Wiersma (1992) reported several findings from his meta-analysis. For the free-time measure, the difference in effect sizes between noncontingent and no-reward studies showed no significant differences. The performance measure also failed to yield statistically significant differences.

When the studies were divided into free-time and performance measures of intrinsic motivation, effect sizes were predominately negative in experiments using the free-time measure. In other words, subjects who had been subjected to contingently administered extrinsic rewards prior to the free-time measure of intrinsic motivation spent less time performing the task than those who received a noncontingent extrinsic reward or those who received no reward—as predicted by CET. In contrast, effect sizes were predominately

positive in experiments that used performance measures. Subjects in the experimental condition who worked for a contingent extrinsic reward performed better than those who received either a noncontingent extrinsic reward or no reward at all.

In conclusion, Wiersma (1992) notes that this meta-analysis explains why the findings of the previous research are inconsistent. The proposition, based on CET, that contingently applied extrinsic rewards reduce intrinsic motivation, is supported when task behavior is measured during a free-time period; however, it is not supported when task performance is measured while the extrinsic reward is in effect. In other words, Wiersma (1992) found that within these laboratory studies, experiments that used performance measures showed that intrinsic and extrinsic rewards can have an additive effect on motivation. This suggests that the effect is closely tied to how intrinsic motivation is operationalized and means that the situations to which CET can be generalized are limited. Specifically, Wiersma (1992) found that generalizability is limited to the workplace, due to inconsistent measures of performance and/or free time and the possibility of workers performing for long-term extrinsic rewards (merit/bonuses) versus immediate rewards (salary).

Meta-Analysis of Overjustification

Tang and Hall (1995) completed a meta-analysis that examined the overjustification effect to determine the conditions under which it occurs. They began by specifying the variables used in the various studies and then identifying characteristics that they believed should be considered in determining consequences of findings.

Tang and Hall (1995) identified five variables generally considered to be important in the overjustification effect situation: interest level, reward contingency, reward type, reward expectancy, and posttask feedback. They classified studies into two interest levels: high and

low. If the experimenter specifically claimed the task was interesting or noted evidence of intrinsic interest in the task, it was classified as high interest. If the experimenter specifically mentioned that the task being used was of low-interest or provided evidence that it was less preferred, it was classified as low-interest (Tang and Hall, 1995).

Two categories of reward contingency were identified in this meta-analysis. The first, self-comparison, included performance-contingent conditions in which there was no information about the meaning of the performance. The second, social comparison, included performance-contingent conditions in which the subject was explicitly provided with information about how he or she was doing relative to others (Tang and Hall, 1995).

Tang and Hall (1995) considered only tangible rewards as a reward type variable. Reward expectancy was classified as either reward-expected or reward-unexpected. Verbalizations, such as positive information, negative information, positive controlling and negative controlling, were all classified as posttask feedback. Tang and Hall (1995) also identified three study characteristics prior to an analysis of the studies. The researchers felt that all three characteristics received little attention but could be crucial for determining the generality of the findings. The three characteristics were age of subjects, dependent variable, and the research design.

Tang and Hall (1995) organized the findings of their meta-analysis around ten situations that included a combination of variables and study characteristics. Situation 1 was the most basic overjustification situation: task interest is initially high and the reward is task contingent, expected, and tangible with no additional feedback. In this situation, the overjustification effect was consistent over age of subjects, research design, and dependent measure.

In situation 2 no comparative information was provided to the subject and a performance-contingent reward was given. Once again, the overjustification effect was consistently found. Situations 3 and 4 are identical to situations 1 and 2 except that initial interest is low. The results for situation 3 indicated some evidence that college students showed increased interest in such conditions. Situation 4 revealed no statistical effects. In situation 5, the reward was not contingent on task performance. Under such conditions, it was predicted that no significant effect should have been found because the reward should in no way be connected to the task. However, Tang and Hall (1995) found some evidence that subjects who received a noncontingent reward exhibited significantly more interest than the nonrewarded control group. Older subjects, when a noncontingent reward is administered, increased their interest in the task being engaged in at that time.

In situation 6, the reward was unexpected. Again, it was predicted that there should be no change in intrinsic motivation because the subject could not say he or she performed the task for the reward. Tang and Hall (1995) confirmed this prediction. The dominant variable in situation 7 was the social comparison feedback. In such situations, the experimenters provided feedback that indicated that the students were doing well in comparison to others. According to the overjustification hypothesis, such feedback should lead to an increase in intrinsic motivation. Limited by only four effect sizes from one-session designs, Tang and Hall (1995) found no significant differences. There was, however, no evidence that such feedback decreased motivation.

In situation 8, the dominant variable was verbal reward. Subjects were expected to conclude from the information associated with the reward that the subject is good at the task. Thus, a desire to engage in the task should increase. Once again, the number of studies and

designs limited the information obtained. There were only five effect sizes from one-session designs using preschool children as subjects. No significance was found.

Situation 9 was similar to situation 8 except that the subject was given increased competency information via positive feedback after the task had been completed. This sometimes occurred with a tangible reward. Information that the subject is good at the task should increase intrinsic motivation for the task. This analysis yielded considerable evidence that interest does indeed increase. Tang and Hall (1995) temper this finding by noting that the only subjects for these studies were college students. In situation 10, the posttask feedback was designed to provide controlling or negative information, hence leading to lower intrinsic motivation. No indication for this predicted effect was found. It appeared that such feedback had no effect on intrinsic motivation.

Tang and Hall (1995) conclude the meta-analysis by noting two important situations in which their findings were not consistent with predictions. In situation 3, where there were low-interest, task-contingent, tangible, and expected rewards, the mean effect size was significantly positive. This finding, they note, suggests that when teachers introduce low-interest subject matter, tangible, task-contingent rewards may enhance interest in the task. The second finding that was found to be inconsistent with predictions involved noncontingent reinforcement (situation 5). In this situation, the subjects should see no connection between the reward and the activity. In the classroom, such a situation might involve providing a reward to all students while they are engaged in a task (e.g., reading). Based on the results of this meta-analysis, noncontingent reinforcement should increase interest in reading (Tang and Hall, 1995)

Tang and Hall (1995) discussed the ecological validity of the findings. Tang and Hall (1995) believe that, among the studies they reviewed, those involving young children were

more ecologically valid than those involving college students. Tang and Hall (1995) agree with Tirrell, Mount, & Scott (1977) and Morgan (1984) that three criteria must be employed to establish ecological validity: natural behavior, natural treatment, and natural setting. Tang and Hall (1995) note that of the studies reviewed in their meta-analysis those involving children employed natural behaviors and treatments, such as school-related tasks. On the other hand, none of the reward studies using college students as subjects utilized academic tasks (such as reading a textbook, listening to a lecture, etc.) in the experiment. The tasks using college students usually involved construction of a puzzle or a nonacademic game.

Tang and Hall (1995) note that researchers often cite methodological and ethical reasons for not attempting to establish more ecologically valid conditions. Reasons cited included difficulty gaining permission to carry out an empirical study in schools and the possibility that experimental manipulation that decreases motivation might have permanent effects on the subjects. Tang and Hall (1995) believe that if a reduction in intrinsic motivation is seen during an experiment, proper debriefing at the conclusion of the study could nullify any possible permanent effects. They suggest that this possibility be investigated.

Meta-Analysis of Extrinsic Rewards and Intrinsic Motivation

Cameron and Pierce (1994) completed a meta-analysis in 1994 that examined the effects of extrinsic rewards and reinforcement on intrinsic motivation. The researchers identified a number of concerns this study hoped to address. Of major importance was whether the bulk of evidence suggests that extrinsic rewards and/or reinforcement decrease intrinsic motivation. If so, what is the size of the relationship being uncovered? The researchers also wondered if different patterns emerge with different reward types (e.g., tangible, verbal), reward expectancies (expected, unexpected), or reward contingencies (e.g.,

rewards delivered for engaging in a task, completing a task, or meeting a specified level of performance). Overall, three research questions were identified in the meta-analysis: (a) Overall, what is the effect of reward on intrinsic motivation?, (b) What are the effects of specific features of reward on intrinsic motivation?, and (c) Overall, what is the effect of reinforcement on intrinsic motivation? (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996). For purposes of the meta-analysis, intrinsic motivation was analyzed on four measures: free time on task after withdrawal of reward; self-reports of task interest, satisfaction and/or enjoyment; performance during the free-time period; and subject's willingness to participate in future projects without reward.

The first analysis included 96 experimental studies that started with Deci (1971) and other relevant studies published up to September 1991. Two sets of studies were collected (between-group designs and within-subject designs). The main analysis entailed assessing the overall effects of reward on intrinsic motivation from studies involving group designs. In these analyses, subjects assigned to different types of rewards, reward expectancies, and reward contingencies were compared to nonrewarded control groups.

The second analysis was conducted on studies that employed a within-subject, multiple-trials design. In this type of design, subjects serve as their own controls. These experiments were conducted in three phases with a number of sessions in each phase. Five studies were selected for the within-subject meta-analysis (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996).

Cameron and Pierce (1994) and later Eisenberger and Cameron (1996) reported the results in two discussions. They reported the results from the group designs and single-subject designs. Group design results indicated that reward does not negatively affect intrinsic motivation on the four measures examined. When rewards are subdivided into

reward type (verbal, tangible), reward expectancy (expected, unexpected), and reward contingency, the findings demonstrate that people who receive a verbal reward spend more time on a task once the reward is withdrawn; they also show more interest and enjoyment than nonrewarded person (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996).

The researchers also found the following: tangible rewards do not decrease intrinsic motivation; verbal rewards increase intrinsic motivation; tangible rewards produce no effect when they are delivered unexpectedly; and tangible rewards are not detrimental when they are expected and contingent on a level of performance or completing or solving a task. Tangible rewards decrease intrinsic motivation when they are given to individuals for simply engaging in an activity. Decreases in intrinsic motivation are also seen when expected rewards are given regardless of the level of performance (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996).

In their conclusion, Eisenberger and Cameron (1996) generalize their findings specifically to reading. They respond to the question of whether reinforcement can be used to increase intrinsic task interest. Eisenberger and Cameron (1996) suggest that no detrimental effects can be expected for rewarding students to read books that they, as individuals, find exciting or dull. However, the extent to which a student comes to regard reading as intrinsically enjoyable or unpleasurable may depend, in part, on a history of positive or negative experiences with reading (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996).

Theoretical implications from the meta-analysis are consistent with the findings of Lepper and Cordova (1992) and Rigby et al. (1992) in suggesting that verbal praise and positive feedback increase intrinsic motivation because of their informational value. Even tangible rewards offered unexpectedly or as a result of completing a task in accordance with

a set of standards were found not to undermine motivation. Those implementing incentives should be cautious, however, when offering an expected tangible reward simply for engaging in or completing a task. Under these circumstances, the promise of a reward may act as a bribe (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996).

Critical Commentary in Response to Cameron and Pierce

The Cameron and Pierce meta-analysis, originally published in 1994, finding limited support for CET, touched a nerve in the research community. In one issue of the *Review of Education Research*, several motivational theorists commented on the study and Cameron and Pierce responded to the commentaries. Kohn (1996), Ryan and Deci (1996), and Lepper et al. (1996) all suggest that the Cameron and Pierce (1994) meta-analysis is flawed and that the conclusions are simplistic. Kohn (1996) objects to the definition of verbal praise and the categorization of praise studies by Cameron and Pierce (1994). He argues that important studies were excluded from the meta-analysis and that it is inappropriate to group verbal praise studies that are simple explanations of pleasure versus those that contain specific verbal feedback.

Ryan and Deci (1996) also object to how Cameron and Pierce (1994) aggregate the studies chosen for the meta-analysis. Studies predicted by CET to have opposing outcomes were aggregated into one meta-analytic category. When such aggregation occurs, according to Ryan and Deci (1996), the result according to CET should be a nullifying effect. Such an effect is exactly what Cameron and Pierce (1994) found but discounted as a lack of evidence for CET. In addition, Ryan and Deci (1996) found the Cameron and Pierce (1994) meta-analysis to be flawed due to a lack of criteria for terms such as “minimal” or “small” effect sizes, defining dependent variables in ways that are consistent with previous motivational

research, and the exclusion of reward studies that showed negative reward effects on performance and/or interest (Ryan and Deci, 1996).

Lepper et al. (1996) begin their commentary by noting that, in a field of research where paradigms frequently clash, the use of meta-analytic techniques does not necessarily guarantee objectivity. These researchers accuse Cameron and Pierce (1994) of “starting with the answer.” They claim that Cameron and Pierce (1994) chose a research question (investigating the main effect of reward) that was long ago answered in the research, and, by virtue of its simplicity, is a fundamentally meaningless question. Lepper et al. (1996) also find fault with the aggregation of studies, the averaging of competing effects, and an interpretation not supported by the statistical findings.

Cameron and Pierce Respond

Cameron and Pierce (1996) responded to criticisms of the meta-analysis. The researchers contend that their results were not well received only by those who argue that rewards produce negative effects on intrinsic motivation under a wide range of conditions. Cameron and Pierce (1996) point out that their analysis of 20 years of research was the most extensive review of literature to date and, rather than reanalyzing their data, the critics chose to claim intentional bias, deliberate misrepresentation, and inept analysis. Cameron and Pierce (1996) go on to refute specific accusations. They defend the “overall question,” claiming that Kohn (1996), textbooks, and the media make blanket statements that the “overall” effects of rewards are negative. Cameron and Pierce (1996) take exception to that generalization and chose to examine the question they feel is most inaccurately reported. The researchers conclude by defending their choice of variables, defending the exclusion of several studies based on a “no-reward” control, and reiterating their aggregation procedures.

Cameron and Pierce (1996) contend that their aggregation was statistically valid and carried out to ensure that the assumption of independence was not violated.

Second Meta-Analysis of Extrinsic Rewards and Intrinsic Motivation

The controversy surrounding the meta-analytic findings of reward contingency studies continued as Deci et al. published another meta-analysis in 1999. This analysis examined 128 studies for the effects of extrinsic rewards on intrinsic motivation—the question in behavioral and motivational research that remained most controversial. Deci et al. (1999) used a hierarchical approach to conduct two primary meta-analyses, one for well-controlled experiments that used free-choice persistence as the dependent measure and the other for well controlled experiments that used self-report interest.

In reporting the results of the meta-analyses, Deci et al. (1999) presented the findings based on the following differentiated categories of reward and contingency types: verbal rewards, unexpected tangible rewards, task-noncontingent rewards, engagement-contingent rewards, completion-contingent rewards, and performance-contingent rewards. In each case, data were discussed in light of the two dependent measures—free choice and self-report.

Deci et al. (1999) first reported on the results for all rewards. With free choice as the dependent measure, rewards significance undermined intrinsic motivation for interesting tasks. With self-report as the dependent measure, rewards did not significantly affect motivation for interesting activities. Deci et al. (1999) went on to report the results of the meta-analysis based on the previously identified categories.

For both dependent measures, positive verbal feedback enhances intrinsic motivation. Secondary analysis in this category, however, indicated that the enhancement in the free-choice measure by verbal rewards applied only to college students and not to children.

Tangible rewards were found to significantly undermine intrinsic motivation for both dependent measures (Deci et al., 1999).

Unexpected tangible rewards did not affect motivation in either the free-choice or self-report measures. Expected tangible rewards, on the other hand, were found to undermine intrinsic motivation when assessed with free-choice or self-report measures. Task-noncontingent rewards with either a free-choice or self-report measure yielded effects that were not significant. Engagement-contingent rewards for both dependent measures were found to undermine intrinsic motivation. Completion-contingent rewards were found to undermine motivation when assessed with either a free-choice or a self-report measure. The last category of rewards examined in the primary analysis was performance-contingent rewards. With free-choice behavior as the dependent measure, performance-contingent rewards were found to undermine intrinsic motivation. However, no effect for performance-contingent rewards was found when self-report was the dependent measure (Deci et al., 1999).

In an additional analysis, Deci et al. (1999) examined the results for one additional reward category—task-contingent. Highly significant undermining was found for task-contingent rewards when free choice was the dependent measure. Significant undermining was also found for task-contingent rewards when self-report was the dependent measure.

Deci et al. (1999) concluded that their meta-analysis strongly supports the differentiated predictions about the effects of rewards on intrinsic motivation made by CER. The only finding not predicted by CET was positive feedback, which did not enhance the free-choice motivation of children. Deci et al. (1999) joined with several other researchers (Ryan, 1991) in calling for the investigation of intrinsic motivation using both free-choice and self-report interest in the same experiment. Deci et al. (1999) suggest that the only way

to ensure one assessment of intrinsic motivation is to use both dependent measures and to consider them as a measure of intrinsic motivation only when they correlate within conditions or studies. The team noted it is unfortunate that relatively few studies have measured both dependent measures and reported the correlations. Therefore, Deci et al. (1999) conclude that we are left with the question of which dependent measure is the more accurate reflection of intrinsic motivation in reward studies.

Critical Commentary in Response to Deci

Reaction to the findings by two research teams known for their work in motivation was published in the same issue of *Psychological Bulletin* (Lepper et al., 1999; Eisenberger, Pierce, & Cameron, 1999). Deci et al. (1999) were afforded the opportunity to react to the commentaries.

Lepper et al. (1999) used their commentary to reflect on the very different conclusions seen across meta-analyses of the same body of motivational research. The writers suggest that the debate that continues to rage regarding the effects of extrinsic rewards on intrinsic motivation began in the early 1970s. Prior to 1970, a behaviorist paradigm dominated how rewards were viewed, as evidenced by the large-scale use of token economy systems and reward programs in classrooms. Around 1971, the potential undermining effects of rewards was demonstrated independently across three laboratories (Deci, 1971; Kruglanski et al., 1971, 1975; Lepper et al., 1973).

For 30 years, research has continued to argue the behaviorist and cognitive points of view. As a result of such diametrically opposing views, Lepper et al (1999) suggest that meta-analytic procedures are not the best way to view this body of research. Due to opposing paradigms, the defining, coding, and interpretation of results may be inherently less precise and contain more bias than considering the studies in isolation. Lepper et al. (1999) note that

the dramatically different conclusions and recommendations presented by Cameron and Pierce (1994), Deci et al. (1999), and Tang and Hall (1995) are striking testimony to the potential subjectivity of quantitative literature reviews.

Eisenberger et al. (1999) did not actually comment in their commentary. Instead they presented the results from two new, smaller meta-analyses. These two studies greater limited the focus of study when compared to previous meta-analytic research. The two new meta-analyses by Eisenberger et al. (1999) investigated only the performance requirement in reward contingency studies. The results indicate that rewards increase perceived self-determination and that rewards' effects on intrinsic motivation depend on the performance requirement. Specifically, reward for meeting vague performance standards reduced subsequent choice to carry out the task but did not affect self-reported interest. Reward for meeting absolute performance standards did not affect free choice but increased self-reported interest. Reward for exceeding others increased both free choice and self-reported interest.

Eisenberger et al. (1999) concluded that reward procedures requiring ill-defined or minimal performance convey task triviality, thereby decreasing intrinsic motivation. Reward procedures requiring specific high task performance convey task significance, increasing intrinsic motivation. Eisenberger et al. (1999) argue that the practical application of such findings is that reward for behavior that is performance contingent will not undermine intrinsic motivation regardless of the reward or initial task interest. These researchers purport that rewards do not result in the perceived loss of self-determination, as defined in CET. Eisenberger et al. (1999) suggest that CET could be altered to assume positive effects of reward on perceived autonomy and competence.

Deci Responds to Commentary

In their response to the two commentaries, Deci et al. (1999) agree with Lepper et al. (1999) that meta-analysis has pitfalls and can, due to the way that studies are collapsed by the researcher, result in a misleading picture of the studies being examined. Deci et al. (1999), however, spend the bulk of the commentary reacting to Eisenberger et al.'s (1999) assertion that CET does not adequately explain the findings of the meta-analyses carried out by Cameron and Pierce (1994), Eisenberger and Cameron (1996), and Eisenberger et al. (1999). Eisenberger et al. (1999) suggest that if CET were to explain all relevant findings, it would require significant revision, especially in the area of performance-contingent rewards.

Deci et al. (1999) charges that the first meta-analysis carried out by Eisenberger et al. (1999) is invalid because the researchers confused locus of control with locus of causality in their definition and coding. They also assert that the second meta-analysis concerning performance-contingent rewards is flawed due to preconceived bias when selecting and coding the studies analyzed. Deci et al. (1999) conclude that CET remains the best supported and most comprehensive theory of reward effects on intrinsic motivation.

More Debate Between Deci and Cameron

Another series of commentaries between Deci et al. (2001) and Cameron (2001) appeared in the Spring 2001 issue of *Review of Educational Research*. Earlier commentaries by Deci et al. (1999) and Lepper et al. (1999) alluded to, or at times, stated directly, that the work of Cameron and Pierce (1994) and Eisenberger and Cameron (1996) contained bias and misrepresentation. In their opening commentary in the 2001 issue, Deci et al. (2001) state that they are not accusing Cameron and Pierce (1994) or Eisenberger and Cameron (1996) of “intentional bias” or “deliberate misrepresentation.” However, Deci et al (2001) argue that

Cameron and Pierce (1994) and Eisenberger and Cameron (1996) used some inappropriate procedures and made numerous errors in their meta-analyses that resulted in invalid conclusions.

Deci et al. (2001) reiterate the conclusions of their 1999 meta analysis. The findings do not differ from the review summarized earlier. A pervasive theme in the debate between Deci et al. (1999) and Cameron and Pierce (1994) has been the extent to which tangible rewards undermine intrinsic motivation and how concerned educators should be when rewarding students. Deci et al. (2001) contend that undermining of intrinsic motivation by tangible rewards is a significant issue. Based on their meta-analysis, expected tangible rewards significantly undermine intrinsic motivation. Deci et al. (2001) conclude that, rather than focusing on rewards to motivate students' learning, it is more important to focus on facilitating intrinsic motivation from the students' perspective. Suggestions for nurturing intrinsic motivation include developing more interesting learning activities, providing more choice, and ensuring that tasks provide optimal challenge (Deci et al., 2001).

Cameron (2001) responds to the reiteration of meta-analytic results by Deci et al. (2001). She reports on the preliminary results of a new meta-analysis that her team conducted. The sample incorporated the databases of Cameron and Pierce (1994), Deci et al. (1999), new studies, and studies missed in previous analyses. Although no analysis is presented (presumably because the meta-analysis is in print elsewhere), Cameron (2001) compares all the meta-analytic findings of these two research teams. She notes several areas of agreement (Cameron, 2001; Cameron & Pierce, 1994; Deci et al., 1999; Eisenberger & Cameron, 1996). For example, verbal rewards have been shown to increase intrinsic motivation. Cameron (2001) also contends that unexpected tangible rewards do not affect measures of intrinsic motivation. In addition, when rewards are tangible, offered beforehand

(expected), and not related to the task at hand (task noncontingent), intrinsic motivation is unaffected.

Cameron (2001) suggests that, once again, the way studies are categorized affects the results of a meta-analysis. She argues that there is not an inherent negative property of rewards. She claims that by organizing studies according to CET (prior to analysis), Deci et al. (1999) collapsed across distinct reward procedures, thereby producing pervasive negative effects. However, she purports, when studies are organized according to the actual procedures used in the original experiment, negative effects are limited to a specific set of circumstances. The areas Cameron (2001) reports negative effects for are (a) reward offered for doing a task (as measured by both free choice and task interest), (b) reward offered for each unit solved (as measured by free choice), and (c) reward offered for doing well (as measured by free choice).

Cameron (2001) concludes by suggesting that rewards can be arranged to progressively shape performance, to cultivate initial interest in an activity, to build skills, and to maintain or enhance effort and persistence at a task. A negative effect occurs, she notes, when a task is of high initial interest, when rewards are tangible and offered beforehand, and when rewards are delivered without regard to success on the task or to any specified level of performance (Cameron, 2001). Due to the limited setting and circumstances where virtually all reward contingency studies are carried out, Cameron (2001) claims that it is difficult to extrapolate the findings of the meta-analyses to applied settings such as classrooms.

Deci et al. (2001) respond to Cameron's (2001) new meta-analysis in the same issue of *Review of Educational Research*. Deci and his colleagues continue to refute the findings by Cameron and her research team (2001). They discount the new meta-analysis because the studies, classification, and data are not presented in Cameron's (2001) commentary. Deci et

al. (201) reassert their claim that CET is the best and most consistent theoretical model for explaining the effects of reward on intrinsic motivation. The last point of the commentary pertains to ecological validity, a concept that has been questioned by many motivational researchers (Cameron, 2001; Deci, 2001; Morgan, 1984; Tang & Hall, 1984). Deci et al. (2001) contend that Cameron (2001) is contradictory in her assertion that application to real-life setting is difficult to extrapolate, yet states that teachers should not be concerned about rewarding students. Taking just the opposite stance, Deci and his colleagues claim that there is serious reason to be concerned about how teachers reward students. They claim that the use of rewards as a motivational strategy is a risky proposition and that educators need to focus more on educational practices that support students' interest and nurture the development of self-regulation (Deci et al., 2001).

Implications of Reward Contingency Meta-Analyses

Perhaps the most important finding about meta-analyses on reward differentiation was offered by Lepper et al. (1999), who suggest that meta-analysis not be used on a body of research that is so empirically complex and theoretically and procedurally diverse. Noting this caution, however, meta-analytic investigation revealed several consistent findings. With the exception of Cameron and Pierce (1994), all the meta-analytic studies found support for CET, but in varying degrees and under differing conditions. The only reward condition acknowledged by Cameron and Pierce (1994) to cause the undermining of intrinsic motivation was when a tangible reward was given only for engaging in a task. Cameron and Pierce (1994) found that all other types of reward conditions (verbal, tangible, expected, performance contingent, and completion contingent) did not undermine intrinsic motivation.

The remaining meta-analyses (Deci, 1999; Rummel & Feinberg, 1988; Tang & Hall, 1995; Wiersma, 1988) found support for CET. Rummel and Feinberg (1988) found that a

variety of reward conditions undermine intrinsic motivation. Wiersma (1992) also found undermining effects. However, for contingent rewards he noted that when performance measures are used, intrinsic and extrinsic motivation could have an additive effect on motivation. Wiersma (1992) also cautioned that his results of many workplace reward experiments could not be generalized to other settings. Tang & Hall (1995) also found general support for CET, with the exception of rewards given for low-interest activities. They noted that when interest was low, task-contingent, expected rewards could enhance motivation. Tang and Hall (1995) also offered a caution regarding ecological validity. They felt that experiments using young children were more valid than those using college students.

Deci (1999) found the most widespread support for CET among the meta-analytic researchers. Deci (1999) noted that verbal and unexpected rewards did not undermine intrinsic motivation. He found that expected, tangible, engagement-contingent, and completion-contingent rewards had detrimental effects on intrinsic motivation. Task-noncontingent rewards were found by Deci (1999) to have no effect and performance-contingent rewards undermined motivation only on measures involving a free-choice period.

All the researchers completing meta-analyses (Cameron & Pierce, 1994; Deci, 1999; Eisenberger & Cameron, 1996; Rummel & Feinberg, 1988; Tang & Hall, 1995; Wiersma, 1988), however, noted a number of problems that appeared to confound any clear-cut conclusions. These included the diversity in definitions of intrinsic motivation, the measurement of motivation, the age of subjects, the nature of the task, and the settings in which the research was conducted.

Most of the meta-analytic researchers (Deci, 1999; Rummel & Feinberg, 1988; Tang & Hall, 1995; Wiersma, 1988) indicated that varying definitions of intrinsic motivation and the measurement of motivation (self-report and/or persistence with a task) made it difficult to

classify studies. Several noted that reward contingency research appears to have been conducted on either very young children or college students (Rummel & Feinberg, 1988; Tang & Hall, 1995; Wiersma, 1988), making generalization to school-age subjects difficult. Virtually all the meta-analyses noted that the experiments lack ecological validity (lacking naturalistic settings such as schools) and did not involve tasks requiring cognitive effort, such as reading (Cameron & Pierce, 1994; Deci, 1999; Rummel & Feinberg, 1988; Tang & Hall, 1995; Wiersma, 1988). Therefore, to better define the conditions under which rewards can enhance or undermine intrinsic motivation, it is necessary to consult the body of experimental research and critical commentary that later became meta-analytic data.

Section VI: Choice as a Variable

Psychological theory and research pertaining to motivation have often entailed the presumption that choice is beneficial. Repeatedly, across many domains of inquiry, psychologists have contended that providing choice will increase an individual's sense of personal control (Rotter, 1966; Taylor and Brown, 1988) and feelings of intrinsic motivation (deCharms 1968; Deci, 1980; Deci & Ryan, 1985). Such personal control and intrinsic motivation have been associated with numerous physical and psychological benefits. Indeed, even seemingly trivial or wholly illusory (Langer & Rodin, 1976,) choices have been shown to have powerful motivating consequences (Iyengar & Lepper, 1999). Choice as a variable in reward contingency studies was first investigated in the mid-1980s.

Early Experiments Using Choice as a Variable

Morgan, in a study and commentary published in 1984, began examining choice as a variable in reward contingency studies. A choice manipulation might be expected to de-emphasize the instrumentality of an activity in obtaining a reward and might, therefore,

mitigate undermining effects or enhance interest in the target activity. Specific experimentation until Morgan's work in 1984, however, revealed mixed results. Three studies support the view that choice can mitigate the undermining effects of rewards. Swann and Pittman (1977) found that adult-selected as opposed to child-selected activities brought about a greater decrease in intrinsic motivation in the typical overjustification paradigm. Zuckerman et al. (1978) found that adults given the choice of puzzles and the choice of how to apportion their time on task showed greater subsequent interest than subjects not given choices. Finally, Fisher (1979) saw an increase in task interest when subjects were allowed to determine their own performance level.

Three other experiments produced an opposite outcome. In studies by Folger, Rosenfield, and Hays (1978), Lepper and Gilovich (1982), and Zuckerman, Porac, Lathin, Smith, and Deci (1980), choice undermined interest in the experimental activities. Some of the conflicting evidence, according to Morgan (1984), can be resolved by examining the meaning of choice manipulations in several of the latter studies. Folger et al. (1978) operationalized choice using the comment "you don't have to participate in the task if you don't want to." Such a comment may have signaled to the subjects that the task was unimportant, thus yielding a decrease in intrinsic motivation. Lepper and Gilovich (1982) found that preschool children who selected their own goals in a block-stacking activity subsequently were less inclined to perform the activity than a group for whom the goals were assigned. The effects of choice seem to have left the preschool subjects floundering. Evidence of confusion was documented by comments in the study such as the subjects saying "I don't know" when asked to set a goal or responding with silence and/or consternation. In other words, according to Morgan (1984), within the young preschool population, choice

may have contributed to feelings of inefficacy as opposed to being assigned a goal that provided specific guidelines to success.

Reiterating that an emphasis on intrinsic aspects of learning is at the heart of many educational philosophies, Morgan (1984) summarized the circumstances under which rewards undermine or enhance motivation. Morgan (1984) reviewed studies from 1976 to 1982 with the following objectives: (a) to examine the conditions relating to the reward-induced undermining and enhancing of intrinsic motivation; (b) to consider possible mechanisms that mediate overjustification effects, particularly as these mediating factors pertain to classroom implications; and (c) to assess the external validity of the laboratory-based research on overjustification and to examine the extent to which classroom studies corroborate the findings.

Morgan (1984) examined the level of subject interest, single versus multiple trials, the effect of choice, the effects of goal setting, and quantity and type of reward. The central finding emerging from this investigation was that rewards could have either undermining or enhancing effects depending on circumstances. For example, Morgan (1984) concluded that it seems appropriate to view the reward from the perspective of the recipient rather than concentrating on reward type, magnitude, etc. In this light, the distinction between reward instrumentality versus reward as a symbol of success is particularly valuable.

Morgan's (1984) investigation revealed that rewards, regardless of type or magnitude, can be enhancing if they are viewed as a symbol of success, thereby enhancing self-determination and lessening perceptions of control. On the other hand, if the reward is perceived as instrumental to the task, a decrement in intrinsic motivation is likely. Morgan (1984) also noted that neither undermining nor enhancing effects are necessarily associated with decrements in performance. Overall, Morgan (1984) summarized that these findings

represented an important advance over the last decade, specifically from the point of view that overjustification effects were cited as a basis for the blanket condemnation of concrete rewards.

Perceived Choice as a Variable

Freehan and Enzle (1991) continued investigating the effects of perceived choice of reward on intrinsic motivation. Specifically, these researchers examined subjects' choice or perceived choice of a reward schedule. Noting the detrimental effects of reinforcement contingencies on intrinsic motivation documented in the research of the several decades preceding their study, Freehan and Enzle (1991) purport that such negative effects might be avoided by considering the work in self-reinforcement. Self-reinforcement refers to procedures by which people establish their own standards of behavior and set the amount of reward receivable upon attaining the standards. They hypothesize that when people control the rewards that influence their behaviors, they should conceive of themselves as exercising ultimate control over their behaviors. Consequently, self-administration of rewards should not undermine high preexisting intrinsic motivation (Freehan & Enzle, 1991).

To test this hypothesis, Freehan and Enzle (1991) conducted two experiments. In Experiment 1, 36 college students participated in a series of construction activities using Lego blocks. The subjects were told that would receive two dollars for building a truck and that the money would be delivered using a quarter dispenser. Three schedules of delivery were arranged, one with choice by the subjects, one with illusory choice, and one control group that received no monetary reward. Following the experiment, a distraction was created and subjects had a 10-minute free-choice period. Their behavior with the Lego pieces was observed. In addition to observing the subject's behavior and recording schedule choice, a

nine-point questionnaire, completed by two reward conditions, asked the extent to which subjects believed they had exercised control over the reward contingency.

The results of the questionnaire, administered only to the illusory reward conditions, indicated that these subjects perceived themselves as having had greater control over the reward than did subjects given no choice. The amount of time spent playing with the Lego kit, the operationalized definition of intrinsic motivation, yielded a significant treatment effect. As predicted, subjects given no choice spent significantly less free-choice time in the activity than did subjects who received no reward or no choice. Also as hypothesized, illusory choice eliminated the detrimental effect on intrinsic motivation. Subjects given an illusory choice showed a level of free play comparable to that of nonrewarded subjects but significantly greater than that shown by subjects given no choice (Freehan & Enzle, 1991).

The same experimental approach was used by Freehan and Enzle (1991) in Experiment 2 to test the effectiveness of illusory choice over reward contingency for enhancing an initially low base-rate activity and then for maintaining the newly acquired activity level after withdrawal of the reward contingency. The only difference in this experiment was the activity. Subjects in Experiment 2 completed math problems rather than Lego construction. Results of the questionnaire, once again, indicated that subjects given illusory choice perceived themselves as being in greater control of the reward contingency than did subjects given no choice. The number of mathematical problems completed did not yield statistically significant differences. All of the subjects in the current no-reward condition voluntarily worked on the problems. The results for the extinction period supported initial expectations. A significant treatment effect was found. Nonrewarded subjects completed few problems as did those given no choice of reward schedule. The

illusory-choice group completed three times as many problems as the subjects not given choice and over twice as many as the nonrewarded subjects.

Freehan and Enzle (1991) offered two conclusions from the experiments. First, choice over schedule of rewards can prevent overjustification, i.e., can avert the potentially damaging effects of extrinsic reward contingencies on preexisting high levels of intrinsic motivation. Second, choice over schedule of reward can maintain gains to initially low base-rate behaviors.

Defining Parameters of Choice

Cordova and Lepper (1996) continued the investigation of the relationship between choice and intrinsic motivation. Specifically, three complementary strategies thought to be associated with motivation—contextualization, personalization, and choice—were examined. The subjects in this study were 72 fourth and fifth grade children. The subjects were randomly assigned to one of five conditions. In the basic control condition, students engaged in two computer-based learning games in an unembellished form. In four experimental conditions, these same learning activities were embedded in simple fantasy contexts. For half of the students in these experimental conditions, fantasies were presented in a generic form; for the other students, several incidental elements in the fantasies were personalized on the basis of background information that had been elicited from the students prior to the experiments. Within each of these groups, half of the students were offered a series of limited choices regarding a number of instructionally incidental features of the fantasies. The remaining students were offered no such choices (Cordova & Lepper, 1996).

The results, taken together, provide strong evidence of the potentially powerful educational benefits that can result from the appropriate use of strategies designed to increase the motivational appeal of learning activities (Cordova & Lepper, 1996). For each of the

three specific strategies examined in the investigation, students exposed to motivationally embellished activities displayed higher levels of intrinsic motivation as measured by persistence and self-reporting. Specifically, significantly increased levels of motivation were found for students who engaged in contextualized activities. Motivation was also significantly increased for personalized learning contexts and with students who were offered choices of learning contexts (Cordova & Lepper, 1996).

Cordova and Lepper (1996) conclude their discussion by commenting on divergent findings in studies that used choice as a variable. They note that the success of the present choice manipulation can be contrasted specifically with the Parker and Lepper (1992) study that failed to identify choice as a significant factor under similar conditions. However, Cordova and Lepper (1996) suggest that the critical difference between the two studies may have been a single choice versus an array of choices. In the present study (Cordova and Lepper, 1996), a series of six or more discrete choices were offered. Perhaps, the researchers suggest, multiple choices is a more powerful motivator than one discrete choice. Cordova and Lepper (1996) also point out that contextualization and personalization were more powerfully related to intrinsic motivation than choice manipulation.

Mixed opinions can be found on whether choice increases the intrinsic motivation to read. Several advocate the use of choice as a powerful way to enhance intrinsic motivation (Guthrie & Wigfield, 2000; Turner, 1995; Worthy, Moorman, & Turner, 1996) while others takes a more cautious stance (Flowerday & Schraw, 2003). Similar to the results of other reward contingency studies, the power of choice to increase motivation in complex learning might vary across task outcomes.

Advocates of choice to enhance motivation can be seen among literacy researchers who study reading engagement. Although these individuals have not carried out reward

contingency studies, their work in reading motivation and reading engagement supports choice as an important component of motivation to consider when arranging and conducting literacy activities. For example, in a commentary on the motivational perspective of literacy instruction, Turner (1995) suggests that a tension exists in instructional setting between allowing students to make choices about their reading or learning and following a prescribed program. Advocates of close adherence to a prescribed program fear that allowing too many choices may interfere with students acquiring necessary skills. However, Turner (1995) contends that research in intrinsic motivation suggests that allowing student choice promotes motivation and intrinsic interest by augmenting students' sense of self-control.

Choice and Reading Motivation

Worthy and McKool (1996) completed a qualitative investigation that examined the factors contributing to negative reading attitudes in school-age children. Like Cordova and Lepper (1996), the subjects of the Worthy and McKool (1996) study were middle school students. The results of this grounded theory identified a series of factors that students who rarely read in school attributed to their lack of reading of motivation. Included in the students' reasons for not voluntarily reading were limited opportunities to read in school, limited access to preferred reading materials, and limited choices in school reading. Worthy and McKool (1996) conclude that allowing students to make choices about their reading material will increase the likelihood that students will engage more in reading.

Guthrie and Wigfield (2000), in a comprehensive discussion of reading engagement, note that the benefits of choice to enhance intrinsic motivation have been demonstrated in many investigations. They suggest that autonomy support and student motivation appear to be reciprocal. As students perceive that teachers respect them enough to provide genuine choices, students increase their effort and commitment to learning. Consequently, when

teachers see that students are taking responsibility for learning by initiating productive reading activities, they will reward students with increased responsibility and opportunities to be self-directed.

Finney and Schraw (2003) voiced a more cautious view of choice as a variable to enhance the intrinsic motivation to read. These researchers conducted two experiments on the effect of choice on cognitive and affective engagement during reading. In both experiments, college students who selected what they read were compared to students who were assigned their reading material. Essentially, both investigations found that unrestricted choice increased positive affective reactions and self-reported interest in reading but had no effect on various cognitive measures of engagement. The results suggest that the effect of choice may depend on the types of tasks being investigated.

Implications of Choice as a Variable in Reward Contingency Studies

Choice is widely acknowledged in the literature as a method for enhancing feelings of self-determination. Many experiments have illustrated the potential motivational and educational benefits of task choice (Cordova & Lepper, 1996; Iyengar & Lepper, 1999), although few have examined reward choice. Both the Cordova and Lepper (1996) and the Iyengar and Lepper (1999) studies showed that allowing grade-school children to make even a trivial task choice increased learning from task and enhanced subsequent interest in the activity. Although Finney and Schraw (2003) noted increases in the affective indicators of reading motivation when choice of reading materials was offered, they did not find gains in the cognitive indicators of reading engagement. To date no studies have examined the specific proximity of an extrinsic reward to a desired behavior (Gambrell, 1996) and how such reward proximity might be affected by choice of reward.

Section VII: Designing Reading Reward Contingency Studies

In arranging an empirical investigation of the effects of reward type and reward choice on the intrinsic motivation to read, guidance can be taken from experimental literature. Clearly, the definition of reading motivation as a dependent variable in an empirical investigation should include both a free-choice, postexperiment period when task persistence can be observed as well as an enjoyment or interest self-report measure (Cordova & Lepper, 1999; Deci et al., 1999). To further define motivation as task persistence, Morgan (1984) notes that as long as no differential contingencies are imposed among activities, one can presume that an individual's relative intrinsic interest in a particular activity is reflected in the time spent engaging in the activity postexperiment. In this study of reward type and choice of reward, the dependent measure is defined as the amount of time and/or number of words read within a prescribed amount of free-choice time. The self-report aspect of the dependent measure asks subjects to rank or choose the "most enjoyable or "most fun" activity (given a variety) they engaged in during the experiment (activity) (Greene et al., 1976).

When arranging for experimental conditions involving a variety of reward contingencies, several researchers have raised concern that those in a control condition (no reward) might experience a decrease in intrinsic motivation due to disappointment (Morgan, 1984; Tang & Hall, 1996). It has been suggested that it might be possible to counter the effects of disappointment by offering a reward similar to those used in the experiment at the end of the day (Tang & Hall, 1995). For example, children in the control condition of this reward contingency experiment could be given a book at the end of the day with the explanation that the teacher (investigator) simply forgot to "thank them earlier for their cooperation."

The age of the subjects in reward contingency studies has been somewhat controversial (Morgan, 1984; Tang & Hall, 1996). Using children in these types of studies has proven more beneficial and reliable than using college students (Morgan, 1984; Tang & Hall, 1996). However, the age of children as subjects has also received attention in the literature. Morgan (1984) has suggested that in order to participate in a reward contingency study that might include overjustification, a certain level of cognitive sophistication is necessary. Morgan recommends using subjects over 7 years of age.

In an investigation of reading motivation in school-age children, concern for levels of existing motivation must also be considered. McKenna (1995) has documented that erosion in reading motivation (both academic and recreational) is generally not seen until fourth grade and above, with the steadiest levels of motivation in second and third-grade seen in average and high-ability readers.

When considering the school-age population as subjects in a reward contingency study of reading motivation, using third-grade students with average reading scores would address the aforementioned concerns for age of subjects and motivation erosion. Third-grade students are over 7 years old and have developed sufficient cognitive discrimination to display or report overjustification. In addition, average readers in third-grade generally do not display eroded academic or recreational motivation (McKenna, 1995; Morgan, 1984).

In addition to considering the age of the subjects, existing levels of reading motivation must also be examined. Following the random assignment of subjects to treatment and control conditions, it is important to document that no significant differences exist in the reading motivation of the students. To do so, Deci (1999) and Morgan (1984) recommend using validated instrumentation. The Motivation to Read Profile (MRP) (Gambrell, Palmer, Codling, & Mazzoni, 1996) extends the work of Henk and Melnick (1992) in reading self-

perception. The MRP consists of two basic instruments that can be used together or separately. There is a reading survey and a conversational interview. The reading survey is a self-report, group-administered instrument that yields levels of existing reading motivation. Specifically, it provides information about the self-concept of the reader and the value of reading. The MRP has been validated for use with elementary-age readers by Gambrell et al. (1996).

The last area of concern often raised in reward contingency studies is ecological validity. Generalizations drawn from a number of the studies have been questioned. Accusations include the use of rewards that are overly powerful or arbitrary (Green et al., 1976), treatment conditions that do not replicate natural learning environments and the use tasks that do not relate to the environment from which the subjects are drawn (Morgan, 1984; Tang & Hall, 1995). Tirrell et al. (1977) offer several suggestions when investigating the effects of reward on intrinsic motivation. The three criteria offered for maintaining ecological validity are (a) investigation of natural behaviors in the experiment, (b) the use of natural treatment conditions, and (c) conducting the experiment in a natural setting. In other words, when investigating reading motivation, the study should be carried out with treatments and under conditions that are as natural for school-age children as possible. In addition, the rewards offered should be minimal for the task and readily available within the environment (Green et al., 1976, Morgan, 1984; Tang & Hall, 1995).

Despite over 40 years of active research on the effect of extrinsic rewards on intrinsic motivation, many questions remain. As noted by a number of researchers (Gambrell & Marinak, 1997; Guthrie & Wigfield, 2000), reading incentive programs are common in elementary classrooms. Teachers use a wide variety of incentive systems, including blanket programs (rewards for entire class), rewards for reluctant readers, and inducements for

struggling readers. These reward programs take many forms, with incentives ranging from food to extra time in the library. And with the enactment of No Child Left Behind and the expectation that all students will be proficient on standardized tests by 2014, incentive programs for scoring well on reading and mathematics tests can now be seen in middle and senior high schools.

It appears, from both the literature review and current practice, that an investigation of the effect of reward proximity and choice on reading motivation might help clarify incentive parameters. Studies indicate that such an investigation should be an empirical design that examines the effects of extrinsic rewards on intrinsic reading motivation as follows: (a) in a naturalistic setting (school/classroom) (Hidi, 2000; Morgan, 1984), (b) with tasks and rewards that approximate classroom experiences and the desired behavior (Hidi & Harackiewicz, 2000), (c) with a population of subjects over age 6 to ensure discrimination of overjustification (Morgan, 1984) but under 12 when overall reading motivation tends to erode (McKenna, 1995), and (d) by utilizing both task persistence and self-report measures of motivation (Cordova & Lepper, 1999; Deci et al., 1999). Despite the cautions raised by many researchers (Deci et al., 1999), it appears that the use of reward systems is on the rise in classrooms at all levels. If this is true, then the question becomes, not whether to reward students, but how to reward them. Specifically, this experiment investigated whether the proximity of the reward, the choice of reward, or a combination of the variables can enhance intrinsic reading motivation of elementary school students.

Conclusion

Research in reward contingency indicates that the perception of the person being rewarded, conditions under which the reward is offered, the experimental task, and the age of subjects all impact whether and to what degree a reward will undermine intrinsic motivation.

It is important to consider the original reward contingency studies in isolation and approach the numerous meta-analyses with caution. As Lepper et al. (1999) suggest, perhaps meta-analysis should not be used on a body of research that is so empirically complex and theoretically and procedurally diverse. Still, generally speaking, reward contingency research reveals a number of important findings. An unexpected reward or one offered for participation does not appear to diminish interest in a task (Lepper et al., 1973). In addition, rewards that occur within the social context of learning and involve interpretation of valued behaviors increase intrinsic motivation (Rigby et al., 1992). Along these same lines, incentives given for completing a high degree of challenging work are motivating (Lepper & Cordova, 1992). Rewards given for work completed in accordance with a specified level of performance have also been found to increase motivation (Cameron & Pierce, 1994; Deci et al., 1999; Eisenberger & Cameron, 1996).

Only a few studies have examined the specific relationship that might exist between extrinsic rewards and reading motivation (McLoyd, 1979; Staats et al., 1964). Notwithstanding the compelling results of Deci et al.'s (1999) meta-analysis that tangible rewards can undermine intrinsic motivation across a wide range of interesting activities, Hidi and Harackiewicz (2000) and Sansone and Harackiewicz (2000) believe it may be premature to conclude that when people are intrinsically motivated, tangible extrinsic rewards will always be detrimental. It has been pointed out that in most, if not all, of the studies included in the various meta-analyses, the effects of external rewards were examined on short and relatively simple activities (Hidi & Harackiewicz, 2000). Hidi and Harackiewicz (2000) maintain that it is inappropriate to assume that the same relationship exists between external rewards and more complex, effortful engagements. In fact, several theorists (Harackiewicz & Sansone, 2000; Hidi & Harackiewicz, 2000; Zimmerman, 1985) contend that extrinsic

rewards might prove beneficial under a number conditions: (a) when paired with performance feedback, (b) when individuals have no initial interest in a task, (c) when the task is effortful and complex, and (d) when subjects have choice over the task and/or the reward.

Given the existing research, further investigations are warranted that examine intrinsic motivation during complex effortful tasks such as reading. No research could be located that explored the role of proximal and less proximal rewards on reading motivation, and only one study (McLoyd, 1997) could be located that investigated the role of choice of reward on reading motivation. Consequently, the purpose of the present study was to investigate the role of proximal and less proximal rewards on intrinsic motivation to read of third-grade readers. In addition, this study explored the role choice of reward on intrinsic motivation to read.

CHAPTER III: METHODOLOGY

The purpose of this study was to examine the effect of two specific reward conditions, proximity of reward and reward choice, on intrinsic motivation to read. Chapter III describes the research methodology that was used in the investigation. Seven subsections describe each aspect of the study in detail: (a) research design, (b) participants, (c) variables, (d) materials, (e) measures, (f) procedures, and (g) data analysis.

Research Design

In single-treatment-variable experiments, a researcher may study the effect of a single independent variable on a dependent variable. In many instances, however, when a researcher enters an educational setting, the experimental treatment cannot be considered realistically in isolation from other factors due to the complex nature of the phenomena. Variables pertaining to learning are difficult to isolate. Many factors may affect, singly or in combination, reading achievement and/or reading motivation. For this reason a posttest-only design with a control group was used in this study. The design allowed the researcher to study the effects of multiple independent variables and to examine joint effects (Pedhazur, 1982).

The children participating in this study were randomly assigned to four treatment groups and a control group. The four treatment groups were book/choice (student selected book), book/no choice (randomly selected book), token/choice (student selected token), and token/no choice (randomly selected token). The control group was no reward/no choice.

The main effects of the independent variables (reward proximity and choice of reward) on the dependent variable (intrinsic motivation to read) were examined. The main effect of factor A is defined as the effect of factor A, averaged across the levels of factor B,

on the dependent variable Y. More precisely, it represents the unique effects of factor A on Y, controlling statistically for factor B. A similar statement can be made for the main effect of factor B (Lomax, 1998).

Participants

The participants of the study were 75 third-grade students from three elementary schools in a large suburban school district serving 12,000 students. The district is located in a mid-Atlantic state. The schools from which the sample was drawn contain 800 students and have a poverty level (as per free/reduced lunch count) ranging from 18% to 25%. The children were selected from an ethnically diverse population. Specifically, the population was 40% Caucasian, 30% African American, 20% Asian, and 10% Eastern European (i.e., Bosnian, Russian, Armenian). Reading achievement was held constant by choosing children for the sample who scored between the 30th national percentile and 60th national percentile in total reading on the Stanford Achievement Test, Ninth Edition. Students scoring in these percentile ranges were selected due to the correlation of negative attitudes toward reading and below average reading achievement (Greaney & Hagerty, 1987).

Variables

The independent variables in the study were the effects of reward proximity and choice of reward on intrinsic motivation to read. The dependent variable was intrinsic motivation to read as measured by three indicators of task persistence (first activity selected, time spent reading, and number of words read) and a self-report question.

Reward proximity in this study was defined as how proximal the reward was to the desired behavior. Rewards considered more proximal to reading motivation were literacy rewards (a variety of books), and rewards considered less proximal to the desired behavior

were nonliteracy rewards (a variety of tokens). These rewards were chosen in accordance with CET (Deci & Ryan, 1985) and reward proximity hypothesis (Gambrell, 1996). It has been suggested in the research that distinctions should be made among different kinds of rewards. If, for example, a person's cognitive evaluation of rewards varies, it is possible that differentiated rewards will have varying effects on that person's intrinsic motivation (Deci, 1971). Reward proximity hypothesis (Gambrell, 1996) suggests that the rewards often given for reading in classrooms (stickers, food) are unrelated to the desired behavior of continuing to read or returning to reading. Reward proximity hypothesis (Gambrell, 1996), in concert with CET (Deci & Ryan, 1985), suggests that intrinsic motivation to read can be enhanced when the reward is proximal to the desired behavior in two ways. First, if the reward is valued and resembles the desired behavior, the person could be led to a process of cognitive affirmation even if the activity is initially interesting. On the other hand, cognitive reevaluation might occur if an uninteresting activity is then viewed as more intrinsically desirable (Deci, 1971).

Choice of reward, in this study, included the choice of a literacy reward (book) or a nonliteracy reward (token). In the treatment groups where choice of reward was offered, the participants had the opportunity to determine the subjective value of an array of literacy (books) and nonliteracy rewards (tokens). Once the value was determined and compared to the value of another reward of the same type (literacy/nonliteracy), a choice was made (Rachlin et al., 1986).

Intrinsic motivation, for the purpose of this study, was defined as task persistence and the self-reporting of enjoyment. Specifically, children were considered intrinsically motivated if they returned to reading and read a measurable number of words in a text following reward when other activities were made available. Affording participants the

opportunity to return to the desired activity (reading) after being rewarded to perform that activity is consistent with personal causation theory (deCharms, 1968). If individuals are intrinsically motivated by an activity and not controlled by outside forces, they are more likely to return to or continue the activity if given the opportunity. Intrinsic motivation was also measured with a self-report question of enjoyment. At the end of the experiment, after the reward, the child was asked which of the experimental activities he/she would report to a friend as most enjoyable.

Materials

Motivation to Read Profile

The Motivation to Read Profile (MRP) (Gambrell et al., 1996) was used to measure the existing reading motivation of all third-grade students in the population from which the random sample was drawn. The MRP is a motivation assessment tool that consists of two instruments: the Reading Survey and the Conversational Interview. The Reading Survey is a self-report, group-administered instrument, and the Conversational Interview is designed for individual administration. Only the Reading Survey was used to measure the existing motivation of the third-grade students in this study. The Reading Survey assesses two specific dimensions of reading motivation: self-concept as a reader and value of reading.

Books for Library Selection

To ensure that the children had never seen the books used in the library array, the titles selected for examination (under the guise of a possible library purchase) were hardcover preview titles not yet released by the publishers. Each book was at a readability level 1 full year below grade level. Readability was measured using three readability formulas: Spache, Dale-Chall, and Fry (Rodrigues, 2000). Books represented a wide variety of interest and topics. There were three fiction titles and three nonfiction titles. The books

ranged from 1,200 to 2,000 words with a mean length of approximately 1,600 words. See Appendix A for a list of the library books and their corresponding readability.

Literacy Reward (books)

The literacy rewards (books) selected by the children were grade- and interest-level appropriate. They represented a wide variety of interest and topics. There were 25 paperback titles in the choice box—approximately 13 fiction titles and 12 nonfiction titles. Each paperback was valued at approximately \$2.50.

Nonliteracy Reward (tokens)

The nonliteracy rewards (tokens) selected by the children were grade- and interest-level appropriate. They represented a wide variety of interests. There were 25 tokens in the choice box. The tokens included Nerf balls, Pez dispensers, friendship bracelets, and key chains. Each token was valued at approximately \$2.00.

Jigsaw Puzzle

A 100-piece jigsaw puzzle was used as one of the activity choices during the free-choice period. The topic of the puzzle was several baby rabbits hidden in vegetation. The jigsaw puzzle was recommended for ages 7-10.

Math Game

A math game was used as one of the activity choices during the free-choice period. The game was age- and interest-level appropriate. The game involved a series of riddle-like problems that required rounding large numbers. The topics of the word problems were an astronomer counting stars and a host counting the guests, coats, and food at a large party. The mathematical concepts required for the game were taught during the second grade curriculum.

Measures

Four measures of intrinsic reading motivation were obtained. They included (1) first activity selected, (2) number of seconds spent reading, (3) number of words read, and (4) how the child responded to the question of the “most fun thing to do” in the experimental room. All four measures were consistent with CET (Deci & Ryan, 1985) and reward proximity hypothesis (Gambrell, 1996). If the child selected a book and read for a measurable period of time during the free-choice period, CET (Deci & Ryan, 1985) would suggest that the child has demonstrated intrinsic motivation to read by returning to reading when afforded an array of choices.

Number of seconds of contact with the book and number of words read are measures consistent with CET (Deci & Ryan, 1985) and reward proximity hypothesis (Gambrell, 1996). Both models postulate that children who are intrinsically motivated to read will have contact with books for longer periods of time and read more text. Specifically, CET (Deci & Ryan, 1985) states that such intrinsic motivation, as measured by time reading and amount read, is influenced by the presence of a reward and whether reward choice is available. Reward proximity hypothesis (Gambrell, 1996) purports that such intrinsic motivation is, as measured by time reading and amount read, influenced by the type of reward and its proximity to reading.

If the child self-reports that the book or reading was the most fun activity in the experimental room, CET (Deci & Ryan, 1985) postulate that the child is intrinsically motivated to read because given similar conditions (choice to read), the child reports reading or the book as the most enjoyable task. Specific descriptions of the measures are below.

First Activity Selected

After the experimental activity and the opportunity to return to reading during the free-choice period, the examiner noted which activity (book/puzzle/math game) the child chose first.

Number of Seconds Spent Reading

If the child returned to reading at any time during the free-choice period, the examiner timed the number of seconds the child read.

Number of Words Read

If the child returned to reading at any time during the free-choice period, the examiner counted the number of words read beyond the initial 250-word sample.

Most Fun Activity

At the conclusion of the free-choice period, the child was asked: "If your best friend asked you what was the best or most fun thing to do in this room, what would you tell them?" The examiner recorded the child's response.

Procedures

Permission

Permission to participate in the experimental activity was sought from the school district and each child's parent or guardian. Permission was sought in accordance with the University of Maryland Review of Human Subjects. See Appendix B for the human subjects proposal, Appendix C for district permission, Appendix D for the parent information letter, and Appendix E for the consent form.

Administration of the Motivation to Read Profile

To ensure that there were no significant differences in the existing reading motivation of the subjects, the Motivation to Read Profile (MRP) (Gambrell, et al., 1996) was administered. Threats to internal validity were minimized as follows: (a) the MRP (Gambrell, et al., 1996) was administered several weeks before the experiment, (b) all third-grade students in each of the elementary schools took the MRP (Gambrell, et al., 1996) prior to the random selection of students for whom permission was granted, and (c) the MRP (Gambrell, et al., 1996) was administered by a reading specialist not affiliated with the study.

Assignment to Treatment Condition

Participants were randomly assigned to one of four treatment groups and a control group. Treatment Condition 1 was book/choice (student selected book); Treatment Condition 2 was book/no choice (randomly selected book); Treatment Condition 3 was token/choice (student selected token); Treatment Condition 4 was token/no choice (randomly selected token); Treatment Condition 5 was the control group that received no reward/no choice. To minimize the possible distraction of the reward, the name of the reward provided was written on a 5-by-7 card. The child was given the 5-by 7 card with the explanation that the reward would be provided by his/her teacher at the end of the day. To counteract any disappointment the children in the no reward/no choice group may have experienced, the researcher provided these students with a reward for “helping” at the end of the day.

Experimental Activity

The experimental activity was choosing to read from one of six trade books that the children were told “might be purchased for the school library.” The title, author, and a brief

description of each book were provided to each child. See Appendix F for the annotations shared with each child.

The various experimental phases for each treatment condition are described below, including the experimental room, the library discussion phase, the description of the reward, reading of the book, after-reading discussion, receipt of the reward, free-choice period, data collection, and the postexperiment question. Each phase of the experiment was the same for all treatment conditions with the exception of type of reward/choice and the description of the reward provided to the subject. After a description of each phase of the experiment, only the differences for the treatment condition are highlighted.

Experimental Room

The experiment was conducted in a room of the elementary school attended by the children. Each child was brought individually to the experimental room by the researcher and seated at a table. The child was invited to sit on the side of the table closest to the door. The researcher sat opposite the child. The table contained an array of six books, a pen, and several blank 5-by 7 cards. Behind the researcher was a file cabinet. Behind the file cabinet was a teacher desk, chair, and another small table. The small table contained a jigsaw puzzle, a math game, a box of choice books, a box of randomly selected books numbered for each child, a box of choice tokens, and a box of randomly selected tokens numbered for each child.

Library Book Discussion

After the child was seated, the researcher explained that the school was considering buying some new books for the library and was interested in his/her opinion of the books. The researcher said, "We are interested in your opinion about some new books that the

school is thinking about buying for the library. I will briefly tell you about each book. After hearing about each book, I would like you to pick a book. Since you do not have time to read the entire book, please read up to the bookmark and then we'll talk about the book. If you don't know a word, that's okay. I'll tell you what it is."

A bookmark was placed inside each book to signal approximately the first 250 words of the book. This procedure insured that each child read or was exposed to approximately the same amount of material.

Description of the Reward

If the subject in the treatment condition received a reward, the reward was described at this time.

Reading of the Book

After describing the reward condition, the researcher provided the title, author, and description of each possible library book purchase. The researcher then said, "Please choose a book and read up to the bottom of the page that has the bookmark. After you have finished reading, I will ask your opinion of the book." After the child chose a book, the researcher said, "Please begin reading. Don't forget, if there is a word you don't know, I'll tell you what it is."

After Reading Discussion

When the child completed the reading, the researcher asked the following questions: "How did you like the part of the book you read today? Do you think your school should buy this book for the library? Why/why not? Do you think this is a book your classmates might enjoy reading? Why/why not?" The researcher recorded the child's answers.

Receipt of Reward

If the subject received a reward as per the treatment condition, reward was given at this time.

Free-Choice Period

After the child completed the experimental activity, the researcher stood, waited for the child to stand up, and moved toward the door as if preparing to take the child back to the classroom. The researcher then looked conspicuously at the clock and said to the child, "It's not quite time to go back to your classroom. I have some work to do over there for a few minutes so you have some free time. Here are some things that you can choose or you can keep reading the book you started. Just do whatever you like? OK?"

The free-choice period lasted 10 minutes. In addition to the book the child read as part of the experimental activity, the researcher placed a jigsaw puzzle and a math game on the table. The researcher moved to the teacher desk and appeared to be working. She observed and timed the activity (activities) the child chose.

Observation and Data Collection

If the child chose the book as the first activity during the free-choice period, the researcher recorded this as the first object contacted. If the child chose the book at any time during the free-choice period, the researcher recorded the number of seconds the child spent with the book. If the child read the book during any amount of the free-choice period, the researcher asked the child to place a bookmark at the last page they completed. This allowed the researcher to obtain an approximate count of the number of words read beyond the initial 250-word sample. This measure was derived by adding the number of words from each page the child appeared to read during the free-choice period past the 250-word marker page up to

the page to the left of bookmark. A child was considered reading when his or her eyes scanned the page from left to right and pages were being turned.

Postexperiment Question

At the end of the free-choice period, the researcher asked the child, "If your best friend asked you what was the best or most fun thing to do in this room, what would you tell them?" The researcher recorded the child's answer.

Treatment Condition 1: Book/Choice

Description of the Reward

The researcher continued with the following directions: "After you have finished reading up to the bookmark and we talk about the book, I will give you a reward for reading. Your reward will be to choose a book from the box I have on the floor. You will get to keep the book you choose."

Receipt of Reward

Following a brief discussion of the book, the child was invited to choose a book as a reward. The researcher said, "Thank you for reading part of one of these new books. Here are some more books. As a reward for reading that part of the book, you may choose one of these books. This reward is yours to keep. I will write the name of the book you chose on this card and your teacher will give the book to you at the end of the day."

Treatment Condition 2: Book/No Choice

Description of the Reward

The researcher continued with the following directions: "After you have finished reading up to the bookmark and we talk about the book, I will give you a reward for reading.

Your reward will be a book from the box I have on the floor. You will get to keep the book I give you."

Receipt of the Reward

Following a brief discussion of the book, the child was given a randomly selected book as a reward. The researcher said, "Thank you for reading part of one of these new books. As a reward for reading that part of the book, you may have this book. This reward is yours to keep. I will write the name of the book given to you on this card and your teacher will give the book to you at the end of the day."

Treatment Condition 3: Token/Choice

Description of the Reward

The researcher continued with the following directions: "After you have finished reading up to the bookmark and we talk about the book, I will give you a reward for reading. Your reward will be to choose a prize from the box I have on the floor. You will get to keep the prize you choose."

Receipt of the Reward

Following a brief discussion of the book, the child was invited to choose a token as a reward. The researcher said, "Thank you for reading part of one of these new books. Here are some prizes. As a reward for reading that part of the book, you may have one of these prizes. This reward is yours to keep. I will write the name of the prize given to you on this card and your teacher will give the prize to you at the end of the day."

*Treatment Condition 4: Token/No Choice*Description of the Reward

The researcher continued with the following directions: "After you have finished reading up to the bookmark and we talk about the book, I will give you a reward for reading. Your reward will be a prize from the box I have on the floor. You will get to keep the prize."

Receipt of the Reward

Following a brief discussion of the book, the child was given a randomly selected token as a reward. The researcher said, "Thank you for reading part of one of these new books. As a reward for reading that part of the book, you may have this prize. This reward is yours to keep. I will write the name of the prize given to you as a reward on this card and your teacher will give the prize to you at the end of the day."

*Treatment Condition 5: No Reward/No Choice*Description of the Reward

The children in this treatment condition did not receive a reward.

Receipt of the Reward

Children in this treatment condition did not receive a reward. The researcher said to the children in the no reward/no choice group, "Thank you for reading part of one of these new books. You helped me a great deal."

Classroom Visit

The children in this treatment condition were not told they would receive a reward at the conclusion of the school day. However, to counteract any disappointment children in the no reward/no choice group may have experienced, the researcher met with the children in this group at the end of the day and explained, "I forgot to reward you for helping me so

much today. You may choose one of the books from this box. I appreciate you helping us choose books for the library."

To prevent contamination by children discussing reward/no reward treatments, all meetings with children in Treatment Condition 5 were conducted on the same day.

Data Analysis

The effect of the independent variables, proximity of reward, and choice of reward on intrinsic motivation to read was measured with three indicators of task persistence and a question of self-reported enjoyment. The indices of persistence were first activity selected, time spent reading, and number of words. The self-report measure was the response to a question regarding the "most fun activity" in the experimental room after reward.

Analysis of Reading Motivation Prior to Study Implementation

Descriptive statistics for the groups representing each combination of factors was the first data analysis. Descriptive statistics were used to clarify and summarize the numerical data. The mean and standard deviation for the total MRP scores, the self-concept subtest score, and the value of reading subtest score were calculated.

After descriptive statistics were calculated, inferential statistics were used to determine if any statistically significant variance in reading motivation existed within or between treatment groups. A one-way analysis of variance (ANOVA) was conducted. In this analysis, only one dependent variable was considered—reading motivation. In a one-way ANOVA, the total variance can be partitioned into two sources: (1) variation of scores within groups and (2) variation between the group means and the grand mean. Both sources reflect variation due to random sampling. In addition, the between-group variation reflects variation

due to differential treatment effects. Since the observed f ratio did not exceed the critical value, post hoc multiple comparisons were not indicated.

First Activity Selected

A nonparametric test was used to analyze the frequency with which the book was the first activity selected during the free-choice period. The nonparametric test utilized the Chi-square distribution in the analysis of nominal data. Specifically, the observed frequencies of first contact with book/puzzle/math game were compared to the theoretical or expected frequencies of the same behavior.

The Goodness-of-Fit Test was used in this one sample test. The analysis revealed whether the observed behaviors are within random fluctuation of the expected frequencies and whether the computed Chi-square is relatively small or less than the critical value. If the calculated Chi-square value exceeds the critical value, a conclusion can be drawn that the differences between the observed and expected frequencies are too great to be attributed to sampling fluctuation and are, therefore, statistically significant. Chi-square was computed for each treatment condition.

Number of Seconds Spent Reading

Descriptive statistics for the groups representing each combination of factors was the first data analysis. Descriptive statistics were used to clarify and summarize the numerical data. The mean and standard deviation for the number of seconds spent reading were calculated for each treatment group.

Following the calculation of descriptive statistics, inferential statistics were used for making generalizations about the population based on this sample. A one-way ANOVA was conducted. In this analysis, only one dependent variable was considered—number of seconds

spent reading. In a one-way ANOVA, the total variance can be partitioned into two sources: (1) variation of scores within groups and (2) variation between the group means and the grand mean. Both sources reflect variation due to random sampling. In addition, the between-group variation reflects variation due to differential treatment effects. Since the observed f ratio exceeded the critical value, post hoc multiple comparisons was conducted to determine which means differed significantly. Fisher's LSD was used as the post hoc test of multiple comparisons to determine if the significant f ratio was due to differences between pairs of means or perhaps to some more complex combination of means.

Number of Words Read

Descriptive statistics for the groups representing each combination of factors was the first data analysis. Descriptive statistics were used to clarify and summarize the numerical data. The mean and standard deviation for the number words read were calculated for each treatment group.

After the descriptive statistics were calculated, inferential statistics were used to make generalizations about the population based on this sample. A one-way ANOVA was conducted. In this analysis, only one dependent variable was considered—number of words read. In a one-way ANOVA, the total variance can be partitioned into two sources: (1) variation of scores within groups and (2) variation between the group means and the grand mean. Both sources reflect variation due to random sampling. In addition, the between-group variation reflects variation due to differential treatment effects. Since the observed f ratio exceeded the critical value, post hoc multiple comparison was conducted to determine which means differed significantly. Fisher's LSD was used as the post hoc test of multiple comparisons to determine if the significant f ratio was due to differences between pairs of means or perhaps to some more complex combination of means.

Most Fun Activity

The researcher intended to use a nonparametric test to analyze the frequency with which the students responded to the question that a book and/or reading was the most fun activity in the experimental room. Chi-square would have been the nonparametric test used in this analysis of nominal data. Specifically, the observed frequencies of a book/reading being reported as the most fun activity would have been compared to the theoretical or expected frequencies of the same behavior.

However, every child in the experiment (75) responded that reading was the “most fun” thing to do in the experimental room. Since every child answered the question with a reading-related response, no variability existed between children in the five treatment conditions and no further analysis could be conducted.

CHAPTER IV: RESULTS AND DISCUSSION

The purpose of this study was to investigate the effects of reward proximity and choice of reward on reading motivation. Specifically, the experiment explored the proximity of reward and choice of reward as variables impacting the intrinsic motivation to read. This chapter discusses the results that were found regarding proximity of the reward to reading and choice of reward.

Based on the theoretical models considered for this investigation, it was predicted that the undermining effects of extrinsic rewards could be mediated by offering a reward more proximal to the behavior being measured. In other words, consistent with CET and reward proximity hypothesis, offering a book for reading should act as a signal of competence or success rather than being perceived as instrumental or controlling. In addition, when coupled with the choice of a book (versus no choice) the enhancing effects of the reward should be greater than if there is no choice of book, a token reward (choice and no choice), or no reward and no choice (control condition).

In the present study, there were five treatment conditions: book/choice, book/no choice, token/choice, token/no choice, and control (no reward/no choice). The research questions were as follows:

1. How does the proximity of the reward affect intrinsic motivation to read?
2. How does choice of reward affect the intrinsic motivation to read?

To answer the research questions, data were collected on four measures of intrinsic motivation. Three of the measures were task persistence and one was a self-report question. The task persistence measures included: (a) first activity selected after reward (books, math game, jigsaw puzzle), (b) number of seconds spent reading after reward, and (c) number of

words read after reward. The self-report measure was a response to the question: "If your best friend asked you what was the best or most fun thing to do in this room, what would you tell them?" Descriptive analysis focused on the first activity students selected by treatment condition. Means and standard deviations for time spent reading and number of words read were calculated for each treatment condition and the response to the "most fun" question) was tallied by treatment condition.

After the calculation of descriptive data, inferential analysis included a series of chi-squares with respect to students' first choice activity. A series of one-way ANOVAs with multiple comparisons was conducted to determine if there were statistically significant differences among the five treatment conditions with respect to time spent reading and number of words read. All children in the study responded that books and/or reading were the "most fun" activity in the experimental room. Therefore, no further analysis could be completed on these data.

Assessment of Reading Motivation Prior to Study Implementation

Prior to the experiment, an assessment of existing motivation was completed. Six weeks before the experiment, a reading specialist who was not the experimenter, administered the Motivation to Read Profile (MRP) (Gambrell, et al., 1996) to all the third-grade students in the elementary schools from which the random sample was drawn. Analysis of preexisting motivation was then completed on the 75 students who were randomly selected from the third-grade population for whom permission was granted.

Reliability and Validity of the Motivation to Read Profile

Gambrell et al. (1996) developed the MRP based on a review of the research and theories related to motivation as well as an examination of existing surveys. Reliability and

validity were achieved through a series of field tests. The criteria for item selection included (a) applicability to grades 2 through 6, (b) applicability to all teaching approaches and materials, (c) suitability for group administration, and (d) accuracy in reflecting the appropriate dimension of motivation, i.e., self-concept or value. After developing an initial pool of items based on these criteria, three experienced classroom teachers, who were also graduate students in reading, critiqued the 100 items for construct validity in assessing students' self-concept or value of reading (Gambrell et al., 1996).

The items that received 100% agreement were compiled. These items were submitted to four classroom teachers who were asked to sort them into three categories: measures self-concept, measures value of reading, or not sure/questionable. Once again, only the items that received 100% trait agreement were selected for the field test. The final version of the instrument was administered in late Fall and early Spring to 330 third and fifth grade students in 27 classrooms in four schools from two school districts in the eastern United States. To ascertain whether the traits measured corresponded to the two subscales (self-concept as a reader and value of reading), factor analyses were conducted using the unweighted least squares method and a varimax rotation. Only items that loaded cleanly on the two traits were included on the final MRP. To assess internal consistency, Cronbach's (1951) alpha was calculated. The Cronbach's alpha revealed a moderately high reliability for both subscales (self-concept = .75; value = .82) (Gambrell et al., 1996).

Analysis of Reading Motivation Prior to Experimentation

The first analysis completed with the MRP data was an ANOVA to determine if statistically significant differences in reading motivation existed between treatment groups. An ANOVA was conducted on the total scores of the Motivation to Read Profile as well as the two subtest scores—self-concept and value of reading. The ANOVA revealed no

statistically significant differences in reading motivation within or between treatment groups for the total motivation to read score. In addition, no significant differences were found between or within groups for the self-concept or value of reading subtests. The results of the MRP are in Table 1.

Table 1. Results of Motivation to Read Profile (MRP)

		Sum of Squares	df	Mean Square	F	Sig.
Total MRP	Between Groups	1342.453	4	335.613	2.022	.101
	Within Groups	11619.467	70	165.992		
	Total	12961.920	74			
Self concept	Between Groups	2.533	4	.663	1.052	.387
	Within Groups	42.133	70	.602		
	Total	44.667	74			
Value of reading	Between Groups	4.400	4	1.100	1.944	.113
	Within Groups	39.600	70	.566		
	Total	44.000	74			

Task Persistence as a Measure of Intrinsic Reading Motivation: First Activity Selected

All students involved in this study participated in an experimental activity. The students were asked to help select books for the library. Specifically, they were asked to choose from a six-book array, read a preselected passage, and respond to three questions. The students were then thanked and rewarded based on the treatment condition.

Following the experimental activity, students were observed during a 10-minute free-choice period. During the free-choice period, they could engage in one of three activities: (1) read from the six-book library collection used during the experiment, (2) work a jigsaw puzzle, and/or (3) play a math game. Students could engage in one activity for the entire free-choice period or change activities as they wished. No specific directions were given. The first activity selected during the free-choice period and the amount of time spent in any/all of the three activity options was recorded.

The first activity selected during the free-choice period was the first measure of task persistence. Descriptive statistics for the first activity selected by each child in each treatment group were examined. Table 2 reveals the frequency of the activities selected (reading, puzzle, math game) by students by treatment condition.

Table 2. First Activity Selected by Treatment Group

First Activity	Book/ Choice (<i>n</i> =15)	Book/ No Choice (<i>n</i> =15)	Token/ Choice (<i>n</i> =15)	Token/ No Choice (<i>n</i> =15)	No Reward/ No Choice (<i>n</i> =15)
Books	13	10	2	3	11
Math Game	1	4	8	8	1
Jigsaw Puzzle	1	1	5	4	3

Children's behavior was charted for first activity selected and any subsequent activity changes. The activities selected are presented by treatment condition in Table 3. The observations revealed that when students chose reading as their first activity and then changed, they chose either the jigsaw puzzle or math game. However, a child who chose the jigsaw puzzle or the math game never changed to reading. No student changed activities more than once during the free-choice period.

It should also be noted that 70 out of the 75 students in the present study chose *ABC Dogs* as the library book to read from during the experimental activity. In addition, during the free-choice period, 35 out of 39 students who chose reading as their first activity chose *ABC Dogs*. Clearly, *ABC Dogs* was the favorite book in the library array. The frequent choice of *ABC Dogs* over other titles in the library array could be related to recent research

indicating a preference for informational text by elementary readers (Kletzien & Dreher, 2004).

Table 3. First Activity Selected and Subsequent Activity Changes

Treatment Group	Number Who Chose Reading First	Number Who Stayed w/ Reading	Number Who Did Not Choose Reading At All	Number Who Chose Math First	Number Who Chose Puzzle First	Number Who Changed From Reading To Puzzle	Number Who Changed From Reading To Math
Book/Choice	13	6	2	0	2	3	2
Book/No Choice	10	3	5	4	1	3	4
Token/Choice	2	0	13	8	5	2	0
Token/No Choice	3	1	12	8	4	1	1
Control	11	6	4	1	3	5	0

A chi-square analysis of the data was completed. The results of the analysis are displayed in Table 4. The chi-square analysis revealed statistically significant differences ($\chi^2 = 28.420, p < .05$) between the students in the book groups and no reward group compared to the token groups. The students in the book/choice, book/no choice, and no reward/no choice group selected reading as a first activity more often than students in the token (choice/no choice) groups.

Table 4. Chi-Square Test of First Activity Selected ($n = 75$)

Test	Value	df	Significance
Pearson Chi-Square	28.420	8	.000
Likelihood Ratio	32.026	8	.000

The chi-square analysis conducted on first activity selected appeared to suggest that of the two independent variables (proximity of reward and choice of reward) only proximity of reward was significant. Therefore, to clarify the role of choice of reward, a chi-square analysis of the choice/no choice treatment conditions was conducted. Table 5 displays the frequency of the first activity selected using only choice/no choice and control as the grouping variable.

Table 5. First Activity Selected By Choice/No Choice

First Activity	Treatment Condition		
	Choice	No Choice	Control
Books	15	13	11
Math Game	9	12	1
Jigsaw Puzzle	6	5	3
Total	30	30	15

A chi-square analysis of the choice/no choice data was completed. The results of the analysis are displayed in Table 6. The chi-square analysis revealed no statistically significant differences ($\chi = 5.672, p < .05$) between the students in the choice and no choice groups. Based on these results, proximity of reward was the only significant variable for first activity selected.

Table 6. Chi-Square Test for the Choice/No Choice Group ($n = 75$)

Test	Value	df	Significance
Pearson Chi-Square	5.672	4	.225

To further verify that proximity of reward was the only significant variable for first activity selected, additional chi-square analyses were conducted using regrouped treatment conditions. The regrouped treatment groups were book (choice/no choice), token (choice/no choice), and control (no reward/no choice). Table 7 contains descriptive statistics for the comparison between the book group, token group, and the control group.

Table 7. First Activity Selected by Proximity of Reward

First Activity	Book Group ($n = 30$)	Token Group ($n = 30$)	Control ($n = 15$)
Books	23	5	11
Math Game	5	16	1
Jigsaw Puzzle	2	9	3

Three additional chi-square analyses were completed. The results are displayed in Tables 8, 9, and 10. The results of the chi-square analysis comparing the book group and token group are presented in Table 8. The results revealed statistically significant differences ($\chi^2 = 21.78, p < .05$) between the students in the book condition compared to the token

condition. The students in the book condition selected reading as a first activity more often than the students in the token condition.

Table 8. Chi-Square Tests for the Book Group and the Token Group ($n = 60$)

Test	Value	df	Significance
Pearson Chi-Square	21.788	2	.000

Second, the results of the chi-square analysis comparing the book group and the control group are presented in Table 9. A chi-square analysis of the data revealed no statically significant differences ($\chi = 2.365, p < .05$) between the book group and the control group.

Table 9. Chi-Square Tests for the Book Group and the Control Group ($n = 45$)

Test	Value	df	Significance
Pearson Chi-Square	2.365	2	.307

Third, the results of the chi-square analysis comparing the token group and the control group are presented in Table 10. A chi-square analysis revealed statistically significant differences ($\chi = 15.17, p < .05$) between the students in the token group and the control group, with the students in the control group selecting reading as a first activity more often than the students in the token group.

Table 10. Chi-Square Tests for the Token Group and the Control Group ($n = 45$)

Test	Value	df	Significance
Pearson Chi-Square	15.171	2	.001

Task Persistence as a Measure of Intrinsic Reading Motivation: Seconds Spent Reading

A second measure of intrinsic motivation collected during the free-choice period was the number of seconds spent reading. If returning to reading was a behavior exhibited at any time during the free-choice period, the number of seconds spent reading was recorded.

Students could change activities among the three choices (reading, jigsaw puzzle, math game) as desired. The number of seconds spent reading was a measure of the total time spent reading during the possible 600 seconds available during the free-choice period.

The number of seconds spent reading during the free-choice period was the second measure of task persistence analyzed. To determine if there were significant differences across the five treatment conditions with respect to seconds reading, a one-way ANOVA with multiple comparisons (Fisher's LSD) was conducted. The means were as follows for seconds reading: book/choice $M=374$, book/no choice $M=303$, token/choice $M=30$, token/no choice $M=67$, no reward/no choice $M=365$. The means and standard deviation for seconds reading are presented in Table 11.

Table 11. Means and Standard Deviations for Number of Seconds Spent Reading

	Mean	Standard Deviation
Book/Choice (<i>n</i> =15)	374.87	237.42
Book No Choice (<i>n</i> =15)	303.20	250.48
Token/Choice (<i>n</i> =15)	30.00	79.73
Token/No Choice (<i>n</i> =15)	67.00	163.62
Control (<i>n</i> =15)	365.87	261.50

An ANOVA was conducted to determine if there were statistically significant differences across the treatment groups for the number of seconds spent reading during the free-choice period. The results of the ANOVA for the number of seconds spent reading appear in Table 12. The one-way ANOVA revealed a statistically significant difference between the treatment groups for seconds reading, $F(4,74)=9.464$, $p<.000$.

Table 12. ANOVA for the Number of Seconds Spent Reading

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	16070353.520	4	417588.380	9.464	.000
Within groups	3088617.867	70	44123.112		
Total	4758971.387	74			

To clarify the results of the one-way ANOVA, post hoc multiple comparisons using Fisher's LSD were conducted for seconds spent reading (Table 13). This analysis revealed statistically significant differences in favor of the students in the book/choice, book/no choice, and the control conditions with respect to seconds spent reading. In other words, students in the book/choice group, the book/no choice group, and the control group spent significantly more time reading than those in the token/choice and token/no choice groups. In addition, an inspection of the post hoc multiple comparisons revealed no statistically significant differences between the book/choice group and the book/no choice group. No statistically significant differences were found between the token/choice and token/no choice groups. These results indicate that choice of reward was not a significant variable in this study.

Table 13. Fisher's LSD Test for the Number of Seconds Spent Reading

Dependent Variable			Mean Dif	Standard Error	Significance
Seconds Reading	Book/Choice	Book/No Choice	71.6667	76.7012	.353
		Token/ Choice	344.8667*	76.7012	.000
		Token/No Choice	307.8667*	76.7012	.000
		No Reward	9.000	76.7012	.907
	Book/No Choice	Book/Choice	-71.6667	76.7012	.353
		Token/Choice	273.2000*	76.7012	.001
		Token/No Choice	236.2000*	76.7012	.003
		No Reward	-62.6667	76.7012	.417
	Token/Choice	Book/Choice	-344.8667*	76.7012	.000
		Book/No Choice	-273.2000*	76.7012	.001
		Token/No Choice	-37.0000	76.7012	.631
		No Reward	-335.8667*	76.7012	.000
	Token/No Choice	Book/Choice	-307.8667*	76.7012	.000
		Book/No choice	-236.2000*	76.7012	.003
		Token/Choice	37.0000	76.7012	.631
		No Reward	-298.8667*	76.7012	.000
	No Reward	Book/Choice	-9.000	76.7012	.907
		Book/No Choice	62.6667	76.7012	.417
		Token/Choice	335.8667*	76.7012	.000
		Token/No choice	298.8667*	76.7012	.000

To further verify that proximity of reward remained a significant variable for the number of seconds spent reading in the post hoc multiple comparisons, an additional one-way ANOVA and post hoc multiple comparisons were conducted using regrouped treatment groups. The book/choice and book/no choice conditions were regrouped as a book group and the token/choice and token/no choice conditions were regrouped as a token group, resulting in three treatment conditions: book, token, and control. The means and standard deviations for the one-way ANOVA using regrouped data are in Table 14.

Table 14. Means and Standard Deviations for Number of Seconds Spent Reading By Proximity of Reward

Treatment Condition	Seconds Spent Reading	
	Mean	Standard Deviation
Book Group (<i>n</i> =30)	339.0333	242.5441
Token Group (<i>n</i> =30)	48.5000	127.8546
Control Group (<i>n</i> =15)	365.86 67	261.4995
Total (<i>n</i> =75)	228.1867	253.5950

An ANOVA was calculated to determine if there were statistically significant differences across the regrouped treatment conditions for the number of seconds spent reading during the free-choice period. The result of the ANOVA for seconds reading is in

Table 15. The one-way ANOVA revealed a statistically significant difference between the treatment groups for the number of seconds spent reading, $F(2,74) = 18.607, p < .000$.

Table 15. ANOVA for Number of Seconds Reading By Proximity of Reward

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	1621565.187	2	810782.593	18.607	.000
Within groups	3137406.200	72	43575.086		
Total	4758971.387	74			

To clarify the results of the one-way ANOVA, post hoc multiple comparisons using Fisher's LSD were conducted for number of seconds spent reading (Table 16). The analysis revealed that students in the book group and the control group spent more time reading than the token group.

Table 16. Fisher's LSD Test for Number of Seconds Spent Reading By Proximity of Reward

Treatment Condition	Mean Difference	Seconds Reading	
		Standard Error	Significance
Books/Tokens	290.5333*	53.8981	.000
No Reward	-26.8333	66.0114	.686
Tokens/Books	-290.5333*	53.8981	.000
No Reward	-317.3667*	66.0114	.000
No Reward/Books	26.8333	66.0114	.686
Tokens	317.3667*	66.0114	.000

Task Persistence as a Measure of Intrinsic Reading Motivation: Number of Words Read

A third task persistence measure of intrinsic motivation collected during the free-choice period was the number of words read by each student. If reading was a behavior exhibited at any time during the free-choice period, the number of words read was recorded. Once again, students could change activities among the three choices (reading, jigsaw puzzle, math game) as desired. It is important to note how number of words read is a different measure of task persistence than number of seconds spent reading. All the books in the library array were picture books. Number of seconds spent reading would include time spent browsing pictures and/or reading words. Number of words read is an actual count of the number of words read regardless of the amount of time spent picture browsing.

To determine if there were significant differences across the five treatment conditions with respect to number of words read, a one-way ANOVA with multiple comparisons (Fisher's LSD) was conducted. The means were as follows for seconds reading: book/choice $M = 497$, book/no choice $M = 403$, token/choice $M = 45$, token/no choice $M = 78$, and no reward/no choice $M = 483$. The means and standard deviation for number of words read are presented in Table 17.

Table 17. Means and Standard Deviations for Number of Words Read

Treatment Condition	Number of Words Read	
	Mean	Standard Deviation
Book/Choice (<i>n</i> =15)	497.80	309.66
Book/No Choice (<i>n</i> =15)	403.87	377.91
Token/Choice (<i>n</i> =15)	45.67	121.14
Token/No Choice (<i>n</i> =15)	78.20	173.38
Control (<i>n</i> =15)	483.20	373.99

An ANOVA was conducted to determine if there were statistically significant differences across the treatment groups for the number of words read during the free-choice period. The result of the ANOVA for number of words read is displayed in Table 18. The one-way ANOVA revealed a statistically significant difference between the treatment groups for number of words read, $F(4,74) = 9.464, p < .000$.

Table 18. ANOVA for Number of Words Read

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	2960111.9	4	740027.980	9.464	.000
Within groups	5926278.3	70	84661.118		
Total	8886390.2	74			

To clarify the results of the one-way ANOVA, post hoc multiple comparisons using the Fisher's LSD were conducted (Table 19). The analysis revealed statistically significant differences in favor of the students in the book/choice, book/no choice, and no reward/no choice conditions with respect to number of words read. In other words, students in the book/choice group, the book/no choice group, and the no reward/no choice group read more words than those in the token/choice and token/no choice treatment groups.

Table 19. Fisher's LSD Test for Number of Words Read

Dependent Variable			Mean Differences	Standard Error	Significance
Words Read	Book/Choice	Book/No choice	93.333	106.2457	.380
		Token/Choice	452.1333*	106.2457	.000
		Token/No choice	419.6000*	106.2457	.000
		No Reward	14.600	106.2457	.891
	Book/No choice	Book/Choice	-93.9333	106.2457	.380
		Token/Choice	358.2000*	106.2457	.001
		Token/No choice	325.6667*	106.2457	.003
		No Reward	-79.333	106.2457	.458
	Token/Choice	Book/Choice	-452.1333*	106.2457	.000
		Book/No choice	-358.2000*	106.2457	.001
		Token/No choice	-32.5333	106.2457	.760
		No Reward	-437.5333*	106.2457	.000
	Token/No choice	Book/Choice	-419.6000*	106.2457	.000
		Book/No choice	-325.6667*	106.2457	.003
		Token/Choice	32.5333	106.2457	.760
		No Reward	-405.0000*	106.2457	.000
	No Reward	Book/Choice	-14.6000	106.2457	.891
		Book/No choice	79.3333	106.2457	.458
		Token/Choice	437.5333*	106.2457	.000
		Token/No choice	405.0000*	106.2457	.000

To further verify that proximity of reward remained a significant variable for the number of words read in the post hoc multiple comparisons, an additional one-way ANOVA and post hoc multiple comparisons were conducted using regrouped treatment groups. The book/choice and book/no choice conditions were regrouped as a book group. The token/choice and token/no choice conditions were regrouped as a token group, and the no reward/no choice was examined as a control group. The means and standard deviations for the one-way ANOVA using regrouped data are in Table 20.

Table 20. Means and Standard Deviations for Number of Words Read by Proximity of Reward

Treatment Condition	Number of Words Read	
	Mean	Standard Deviations
Book Group (<i>n</i> =30)	450.833	342.8089
Token Group (<i>n</i> =30)	61.9333	147.8865
Control (<i>n</i> =15)	483.2000	373.9872
Total (<i>n</i> =75)	301.7467	346.5348

An ANOVA was calculated to determine if there were statistically significant differences across the regrouped treatment conditions for the number of words read during the free-choice period. The results of the ANOVA for words read are in Table 21. The one-

way ANOVA revealed a statistically significant difference between the treatment groups for number of words read, $F(2,74) = 144.29, p < .000$.

Table 21. ANOVA for Number of Words Read by Proximity of Reward

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	2885997.753	2	144.2998.877	17.315	.000
Within groups	6000392.433	72	83338.784		
Total	8886390.187	74			

Post hoc multiple comparisons using the Fisher's LSD are presented in Table 22. The analysis found that students in the book group and the control group read more words than those in the token group.

Table 22. Fisher's LSD Test for Number of Words Read by Proximity of Reward

Treatment Condition	Number of Words Read			
	Mean Difference	Std. Error	Significance	
Books	Token	388.9000*	74.5380	.000
	No Reward	-32.3667	91.2901	.724
Token	Books	-388.9000*	74.5380	.000
	No Reward	-421.2667*	91.2901	.000
No Reward	Books	32.3667	91.2901	.724
	Token	421.2667*	91.2901	.000

Self-Report Question as a Measure of Intrinsic Motivation: Most Fun Activity

Every child in the experiment (75) responded that reading was the “most fun” thing to do in the experimental room. Since every child answered the question with a reading-related response, no variability existed between children in the five treatment conditions and no further analysis could be conducted.

CHAPTER V: SUMMARY AND CONCLUSIONS

Purpose

The purpose of this study was to investigate the effects of reward proximity and choice of reward on intrinsic motivation to read. Specifically, the study explored the effects of rewards that were more or less proximal (books or tokens, respectively) to the desired behavior (reading) and choice of reward on third-grade average readers' intrinsic motivation to read.

Research Questions

This investigation addressed two major research questions about the effects of rewards and choice of reward on intrinsic motivation to read. In this study, average third-grade readers were randomly assigned to one of five treatment conditions (book/choice, book/no choice, token/choice, token/no choice, and control) to answer the following questions:

1. Does the proximity of the reward affect intrinsic motivation to read?
2. How does choice of reward affect intrinsic motivation to read?

Findings and Discussion

This study explored the conditions under which rewards increase or decrease subsequent reading motivation. The study examined the effects of a reward that was proximal to the desired behavior of reading (books), a reward that is less proximal to the desired behavior (token), and no reward on third-grade average readers' intrinsic motivation. In addition, the effect of choice of reward was explored. Intrinsic motivation was assessed through a series of task persistence measures and a self-report question: first choice of activity (reading, puzzle, math game), time spent reading, number of words read, and a

question regarding the “most fun activity” completed in the experimental room. Time spent reading and number of words read reflect actual engagement with reading during the free-choice period.

Review of the literature on rewards suggests that rewards undermine intrinsic motivation (Deci, 1971, 1972; Deci, et al., 1999). This study was primarily grounded in the theoretical work of Deci and his colleagues (Deci, 1971 & 1972; Deci, et al., 1999) suggesting that rewards undermine intrinsic motivation. The undermining hypothesis of cognitive evaluation theory suggests that under certain conditions, rewarding students for engaging in an activity or behavior will decrease motivation to engage in that activity (Deci, 1971 & 1972; Deci, et al., 1999). These conditions, defined as a differentiated concept of extrinsic motivation by Rigby et al. (1992) notes that if a reward condition invites a subject into self-determination, intrinsic motivation should not be undermined.

This study was also designed to test the reward proximity hypothesis (Gambrell, 1996) that suggests that type of reward may play an important role in whether motivation is undermined by rewards. In other words, rewards that are proximal to the desired behavior (books) may mediate the undermining effects of extrinsic rewards. This study also explored the role of choice of reward on third-graders’ intrinsic reading.

A major finding of this study was that the students given a book (proximal reward) and the students who received no reward were more motivated to engage in subsequent reading than the students that received a token (less proximal reward). While the intrinsic motivation of the book group and the control group was comparable, the intrinsic motivation of the token group decreased on three measures of intrinsic motivation; first activity selected, number of seconds spent reading and number of words read. The findings from the present

study indicate that the proximity of the reward to the desired behavior is a particularly salient factor in enhancing motivation.

Specifically, students who received a book reward and those who received no reward selected reading as their first activity more often than students in the token group. In addition, students who received a book reward and those who received no reward spent more time reading and read more words than students who received a token reward. In this study tokens proved to be more undermining to intrinsic reading motivation than a more proximal reward (book) and no reward at all.

Clearly, the results of the present study support the reward proximity hypothesis (Gambrell, 1996) and Rigby et al.'s (1992) differentiated concept of extrinsic motivation within CET (Deci, 1971). In accordance with the reward proximity hypothesis, the reward of a book was sufficiently proximal to the desired behavior of reading that intrinsic motivation was not undermined by the extrinsic reward.

The reward proximity hypothesis, as seen in the results of this study, appears to be consistent with Rigby et al.'s (1992) differentiated definition of extrinsic motivation. Rigby and his colleagues (1992) suggest that rewards do not necessarily undermine intrinsic motivation if the reward condition invites subjects into self-determination. They argue that under certain conditions children can be self-motivated even when offered external rewards. What is crucial, these researchers contend, is the social context within which the reward is offered—specifically that of positive feedback and supporting competence (Rigby et al., 1992). The results of this study suggest that receiving a reward proximal (book) to the desired behavior (reading) was perceived by the students as “sufficiently positive and supporting competence” (Rigby et al., 1992); therefore, intrinsic motivation was not undermined.

Choice of reward did not appear to affect intrinsic motivation to read of the third graders in this study. Choice of a book or choice of a token did not influence the first activity selected after reward, the time spent reading, or the number of words read. While choice has been identified as an important variable related to intrinsic motivation (Deci et al., 2001; Rigby et al., 1992) in this study choice involved only choice of a reward. Choice in this study did not pertain to choice of activity or task. In this study, choice of reward was not found to be a salient variable affecting intrinsic motivation to read.

In addition to the above major findings, an observation related to the self-report question posed to each participant was made. At the conclusion of the experiment students were asked, "If your best friend asked you what was the best or most fun thing to do in this room, what would you tell them?" All students (100%) who participated in the study reported they would tell a friend that reading was the "most fun" activity completed in the experimental room. Interestingly, some students chose only to engage with the jigsaw puzzle and/or the math game during the entire free-choice period. These students, therefore, engaged in reading only during the discussion about possible book selection for the school library. At the beginning of the experiment, students in this study, as a part of the experimental activity worked one-on-one with an adult, read a text they selected, and provided information about the appropriateness of the book for their library. The students' responses that reading was the "most fun" activity suggest that they viewed the library book selection activity as enjoyable and supporting autonomy rather than exerting control over their preferences and/or actions (Deci, Nezlek, & Sheinman, 1981). However, the results of the present study suggest that for the token group the experimental activity was not sufficiently motivating to overcome the undermining effects of token rewards.

Overall, the present study supports the reward proximity hypothesis (Gambrell, 1996) and provides some clarification of the undermining effects of extrinsic tangible rewards (Deci, 1971; Deci, 1972). As predicted, the effects of undermining were mediated by offering a reward more proximal to the motivational behavior being measured (subsequent engagement in reading). Rewards more proximal to reading (books) did not depress or undermine intrinsic reading motivation when compared to rewards less proximal to reading (tokens). In this study, there were no differences in the intrinsic motivation of students who received a book reward or who received no reward. However, students who received a token reward selected reading as their first activity less often than students who received a book or no reward. In addition, students who received books as rewards and students who received no reward spent more time reading and read more words than students who received a token reward. The results of this study suggest that literacy-related rewards such as books can enhance children's subsequent engagement with text as compared to the use of nonliteracy rewards such as tokens.

Conclusions

Three conclusions can be drawn from the present study. The first conclusion, consistent with reward proximity hypothesis and CET, is that rewards proximal to the desired behavior, such as books to reading, do not undermine intrinsic motivation. Specifically, when offering extrinsic rewards for reading, books are less undermining to intrinsic motivation than rewards less proximal to reading such as tokens. In this study, students who received a reward more proximal to reading (book) or no reward at all subsequently demonstrated higher levels of reading engagement by choosing to read more often and reading more text than students who received a less proximal reward (token).

The second conclusion, also supported by reward proximity hypothesis and CET, is that less proximal rewards, such as tokens, undermine intrinsic motivation. Specifically, when offering extrinsic rewards for reading, tokens are more undermining to intrinsic motivation than rewards more proximal to reading such as books or no reward at all. Students who received a less proximal reward (token) subsequently demonstrated lower levels of reading engagement by choosing to read less often and reading less text than students who received a more proximal reward (book) or no reward.

Finally, although choice has been demonstrated to be a powerful aspect of intrinsic motivation (Deci, 2000; Rigby et al., 1992; Gottfried, 1985; Guthrie & Wigfield, 1997), the choice of reward was not found to be a salient factor in this study. The type of reward (book or token) was a significant factor, while choice of reward had no apparent effect on the intrinsic motivation to read. Choosing a book or choosing a token versus receiving a randomly selected book or token neither enhanced nor undermined subsequent reading motivation.

Implications

This study has significant implications for the theory, research, and practice of reward contingency and intrinsic motivation. It is clear that the debate over the potentially undermining effects of rewards will continue (Deci, et al., 2001; Deci et al., 1981; Fawson & Moore, 1999). Based on the findings reported in the literature, it is evident that many educators use rewards for reading (Deci, et al., 2001; Deci et al., 1981; Gambrell & Marinak, 1997). In some cases, the incentive programs are for whole class or whole school efforts. In other instances, teachers use reward programs in an attempt to motivate uninterested and/or struggling readers (Hidi & Harackiewicz, 2000). Regardless of why or when educators might employ a reading incentive program, the findings of this study are interpreted as support for

the reward proximity hypothesis and have significant implications related to increasing and sustaining reading engagement.

Implication for Theory

An ongoing exchange in *Review of Education Research* (2001) features two opposing research groups that have been investigating the effects of rewards on intrinsic motivation for decades (Cameron, 2001; Deci, Koestner, & Ryan, 2001). Deci et al. (2001), as a result of empirical investigations and meta-analyses, concluded that extrinsic rewards, under many conditions, could undermine intrinsic motivation. Cameron and Pierce (1994), in a series of meta-analyses of research on incentives and rewards, concluded that the undermining effects of rewards are minimal and largely inconsequential for educational practice and policy. This debate represents opposing theoretical models of motivation. Dichotomous theories of motivation are those that contrast learning as a self-initiated process and learning as a series of conditioning experiences.

Deci and his colleagues (Deci, 1971; Deci & Ryan, 1980) have proposed CET to explain the relationship between rewards and intrinsic motivation. Cognitive evaluation theory proposes that innate psychological needs for competence and self-determination underlie intrinsic motivation. Accordingly, the effects of rewards on intrinsic motivation are a function of how the reward influences a person's perception of competence and self-determination. The meta-analysis by Deci et al. (1999) found that tangible rewards tend to undermine intrinsic motivation for the rewarded activity. Deci and his colleagues (1999) suggest that rather than focusing on rewards, teachers should focus more on how to facilitate intrinsic motivation. In accordance with CET, the researchers suggest three specific ways to facilitate intrinsic motivation: begin instruction from the students' perspective to develop interesting activities, provide more choice, and ensure that tasks are challenging.

Cameron and Pierce (1994), writing from the behaviorist perspective, argue that extrinsic rewards do not have pervasive negative effects on intrinsic motivation; consequently, there is no reason for teachers to resist using rewards in the classroom. In particular, Cameron (2001) posits that for low-interest tasks, extrinsic rewards can be used to increase motivation and performance. On high-interest tasks, nontangible rewards (feedback) and tangible rewards linked to success or specific performance standards enhance interest and motivation. Cameron and her colleagues (2001) agree that negative effects for rewards can occur when a task is of initial high interest, when rewards are tangible and offered beforehand, and when the rewards are given without regard to success or performance. Under these conditions, research suggests that individuals spend less time on the task and report less enjoyment than nonrewarded individuals.

Associated with both theories of motivation are reward contingencies. However, after five decades of intense research, questions continue to be debated about the effects of extrinsic rewards on intrinsic motivation. It appears clear, after a score of experimental studies and a number of meta-analyses, that the effect of extrinsic rewards on intrinsic motivation cannot be addressed with a single question. Findings of experiments and subsequent clarifications of theoretical models indicate that many variables can enhance or undermine subsequent motivation (Ryan & Deci, 2000). Differential effects such as initial motivation, interest, and reward value have been and continue to be examined. This study empirically investigated the effect of two such differentiated reward conditions on intrinsic motivation to read: reward proximity and choice of reward. The proximity of reward to the desired behavior was found to be particularly salient while choice of reward did not significantly affect subsequent motivation.

Implications for Research

In light of recent attention to national reading scores and models of accelerated intervention, elementary educators are focusing their efforts on increasing both reading achievement and reading motivation. Fawson and Moore (1999) reported that in 95 percent of classrooms surveyed, elementary school teachers conducted some variation of a reading incentive program. Fawson and Fawson (1994) suggested that if incentive programs are used, rewards that connect reading or writing such as a free book or writing materials should be provided. However, they offer no research to support this recommendation. In keeping with the findings of Deci et al. (2001), Fawson and Fawson (1994) also suggest that incentives should be focused on those students who have not yet developed an interest in, or understanding of, the value of reading. Lastly, Fawson and Fawson (1994) urge the designers of reading incentives to limit the duration of the program. They argue that incentive programs should "spark an interest in reading" and then intrinsic interest should sustain future reading (Fawson & Fawson, 1994).

Regardless of whether teachers purchase or design their reading incentive programs, they do so with the hope of nurturing "continuing motivation" (Maehr, 1989). Maehr (1989) defines "continuing motivation" as the tendency to return to a task in similar circumstances and without visible pressure. In other words, teachers reward reading so children will continue to engage in the behavior and return to it regularly without request or coercion.

Therefore, according to the present study, the goal for classrooms that have reading incentive programs should be to do so in ways that reduce or eliminate the potentially undermining effects of extrinsic rewards. Such programs might be designed in accordance with a "redefined" (Csikszentmihalyi, 1991) or "differentiated" (Rigby et al., 1992) definition of reward. Several prior experiments (Ryan & Deci, 2000) as well as the present

study contribute to a body of work that can guide the use of enhancing (versus undermining) reading rewards.

Csikszentmihalyi (1991) describes a "flow" of learning that all educators hope to achieve with readers. He proposes that such a "flow" contains several characteristics. First is of how readers respond to academic expectations. Children continually receive stimuli (requests) in their classrooms. Depending upon their intrinsic motivation to read, that stimulus can either be turned into a challenge or an obstacle. If intrinsically motivated, reading will be viewed as a meaningful challenge. A second and related characteristic of "flow" is the possession of goals. A goal is necessary so learners can receive the necessary feedback to revise or attain the goal.

Many teachers, Csikszentmihalyi (1991) noted, know "that the best way to achieve their goals is to enlist student's interest." They do this by offering what might be termed "redefined" rewards. Redefined rewards include (a) being sensitive to their student's goals and desires, (b) offering choices in reading, and (c) providing clear and helpful feedback. In many classrooms, rewards and incentives are an integral way teachers attempt to "enlist their student's interest" (Csikszentmihalyi, 1991). Several literacy motivation studies support the use of carefully designed incentive practices or programs to enhance the motivation of young readers (Cameron & Pierce, 1994).

Rigby and his colleagues (1992), identified three social contextual factors that promote intrinsic motivation: (1) a meaningful rationale so that the individual will understand the personal importance of the activity, (2) an acknowledgment of the person's feelings so that he/she will feel understood, and (3) an interpersonal environment that emphasizes choice rather than control. Rigby et al. (1992) conclude that with this

“differentiated concept of extrinsic motivation—that which invites learners into self-determination—learning is maximized.”

The current study further differentiates the context in which rewards can be offered for reading without undermining subsequent intrinsic motivation to read. Findings from the present study suggest that rewards that are proximal to the desired behavior (books for reading) can mediate the undermining effects of extrinsic rewards. In other words, reading incentive programs designed to invite children into reading should reward the behavior with books (or other literacy-related activities such as time to read, etc.) rather than with rewards less proximal to reading, such as tokens. Future investigations of the reward proximity hypothesis should include a more detailed self-report protocol that would allow probing the subjects' specific interpretations of the “most fun” activity in the experimental room when a reading or library scenario is used during the experimental activity. In addition, although reading motivation was not undermined with the reward of a book or no reward, it would be important to utilize proximal rewards and then observe reading motivation in a more naturalistic setting such as the classroom. Observing reading motivation in a more naturalistic setting would also allow the researcher to investigate short term intrinsic motivation (as demonstrated during the 10-minute free-choice period in this study) and long term intrinsic motivation (over a period of days or weeks during classroom reading).

Future research on the reward proximity hypothesis might investigate the effect of more and less proximal rewards following a nonliteracy-related experimental activity. In other words, although the undermining effects of extrinsic rewards were mediated in this study by giving the reward of a book for reading, the mediating effects of proximal rewards in other learning situations such as mathematics and science warrant investigation.

Finally, this study focused on average third-grade readers because of the important role motivation plays during early reading development. Additional investigations of the reward proximity hypothesis need to be conducted with a number of populations, including older readers and particularly struggling readers. It is not known if rewards more proximal to reading will mediate the undermining effects of extrinsic rewards with readers above or below third-grade.

In addition, more research is needed to identify the motivational processes that might cause reading interventions to be more or less effective. Specifically, it appears crucial to determine how interest in a difficult activity, such as reading for struggling students, can be nurtured and maintained. The use of extrinsic rewards may be important for unmotivated students who lack interest or intrinsic motivation (Hidi & Harackiewicz, 2000). While this study found support for the reward proximity hypothesis with average third-grade readers, future research will be necessary to determine if reward proximity can mediate the undermining effects of extrinsic rewards for struggling readers.

Implications for Practice

A number of practical implications can be drawn from this study to support teachers in using rewards that will not undermine intrinsic motivation to read. We know that many teachers already use rewards in their reading programs (Fawson & Fawson, 1994). Findings from the present study suggest that there are practical implications that should be taken into consideration when choosing and/or designing reading incentive programs that reflect a “redefined” or “differentiated” definition of reward.

Using Rewards That Are Proximal to Reading Supports Intrinsic Motivation to Read

The present study indicates that the type of reward—specifically the proximity of the reward to the desired behavior—should be carefully considered (Gambrell, 1996) when using incentive programs in the classroom. If the desired behavior is reading, rewards that are proximal to engaging with books should be offered, such as books, increased read-aloud time, increased time for self-selected reading, increased library time, and increased number of books available.

Consistent with Rigby et al.'s (1992) differentiated definition of extrinsic motivation within CET and reward proximity hypothesis (Gembrell, 1996), in this study the reward of a book did not undermine intrinsic motivation to read. It may be that using proximal rewards increases students' sense of personal competence and signals task mastery, thereby, increasing the likelihood of sustained reading engagement (Lepper et al., 1996).

Type of Reward Is More Important Than Choice of Reward

While the research on learning clearly indicates that choice is a powerful influence on motivation (Deci, et al., 2001; Rigby et al., 1992), the results of the present study suggest that choice of reward is not nearly as salient as type of reward. Instead of focusing on reward choices, educators who want to promote intrinsic motivation to read should be encouraged to consider reward alternatives that are proximal to reading. It may be that providing reading-related rewards sends a message about the value of reading and sustained engagement with text.

Carefully Chosen Rewards Can Foster a Culture of Reading Motivation

Turner (1995) urges teachers to know what is done in classrooms in the name of literacy and how it affects children. What and how children learn, she notes, are intimately

intertwined. So, too, the case can also be made that rewards and the classrooms in which they are offered are inseparable. If this is true, rewards offered for reading should be a natural extension of a literacy-rich classroom culture (Gambrell, 1996). This study clearly found support for the reward proximity hypothesis and the use of books as appropriate reading rewards. However, the importance of reading-related rewards may go beyond recognizing the relationship between reward proximity and the desired behavior. It could be that the real value of using books to reward reading and foster intrinsic motivation is that both the desired behavior (reading) and the reward (books) define a classroom culture that supports and nurtures intrinsic motivation to read.

APPENDIX A: READABILITY OF LIBRARY BOOK ARRAY

Book Title	Spache*	Dale-Chall*	Fry*
Cock-A Doodle-Do	2.3 g.e.	2.2 g.e.	2.3 g.e.
Locomotive: Building an Eight Wheeler	2.3 g.e.	2.4 g.e.	2.4 g.e.
Ghost of the Southern Belle: A Sea Tale	2.0 g.e.	2.2 g.e.	2.2 g.e.
ABC Dogs	2.0 g.e.	2.1 g.e.	2.2 g.e.
Mud Flat Spring	2.1 g.e.	2.2 g.e.	2.2 g.e.
Stone Girl, Bone Girl: The Story of Mary Anning	2.2. g.e.	2.3 g.e.	2.3 g.e.

* Readability based on Readability Master 2000 (Rodrigues, 2000).

APPENDIX B: REVIEW OF RESEARCH USING HUMAN SUBJECTS

Identification Project Title: The effects of reward proximity and choice of reward on the reading motivation of third-grade students.

I. Purpose The purpose of this study is to explore the role of extrinsic rewards and reward choice on the intrinsic motivation to read.

II. Subject Selection The subjects will be third-grade students from four elementary schools in the district where the researcher is employed. The students selected will have a reading level based on a standardized measure between the 30th and 50th national percentile. Participation will be anonymous and voluntary. Dr. Barbara Hasson, Superintendent of the Central Dauphin School District, has granted permission for the study to take place in four elementary schools in the district.

III. Procedures The subjects will be asked to select a book that is being considered for purchase in their school library. They will be asked to read a 250-word sample. Following the reading, the subjects will be rewarded. The rewards will involve literacy/non-literacy rewards and choice/no choice. Following the reward, they will be asked to choose an activity during a 10-minute free-choice period. Reading will be one of the activities from which they could choose. A jigsaw puzzle and a math game will also be available. The subjects will be observed during the free-choice period.

IV. Risks/
Potential
Benefits There are no risks. Potential benefits include being able to provide classroom teachers with guidelines for arranging effective reading incentive programs.

V. Protection/
Confidentiality All subjects will remain anonymous. The children will be randomly assigned to treatment groups. Once assigned to treatment groups, names will no longer be used. The children will be assigned a numeric code. The numeric code will be used on all observation and data collection forms. The lists of children's names and corresponding codes will be held only by the researcher in a password-protected file. Permission forms from parents will be kept in a locked file cabinet in the school district's administration building.

VI. Information
Provided to
Subjects A permission form is enclosed. Parents and teachers were informed of the purpose of the study.

APPENDIX C: DISTRICT PERMISSION

APPENDIX D: PARENT INFORMATION LETTER

Dear Parent,

Your child has been randomly selected to participate in a study of reading motivation. In this study for my doctoral dissertation research, I am interested in talking with children about what motivates them to read. This experiment will entail one brief (20 minutes) visit with your son/daughter. During the visit, your child will be asked a series of questions about their reading interests. In addition, they will have the opportunity to read part of a new book that is being considered for purchase in the school library.

Dr. John Scola, Assistant Superintendent for Elementary Education and your child's principal are aware of the research and have given permission for the study to take place in your child's school. Your child's identity and all information pertaining to the study will remain strictly confidential. If you have any questions about the study, you are welcome to call me at 545-4703, ext. 217. You are also invited to contact my faculty advisor, Dr. Linda Gambrell. Dr. Gambrell can be reached at 1-864-656-7656.

In order to give permission for your child to participate, please fill in your child's name and school. Then sign and date the consent form and return it in the enclosed self-addressed stamped envelope. I look forward to talking with your child about his/her reading interests and new books for the library. Thank you very much.

Sincerely,

Barbara Ann Marinak

APPENDIX E: PARENT CONSENT FORM
READING MOTIVATION STUDY

Child's Name

School Name

My signature below grants permission for my son/daughter to participate in a research study being conducted by Barbara Ann Marinak. This research is being conducted as part of Mrs. Marinak's doctoral program at the University of Maryland, College Park, Department of Curriculum and Instruction.

The purpose of the study is to investigate the reading motivation of third-grade students. Mrs. Marinak, a Ph.D. candidate, will hold a brief visit with my son/daughter. During the visit, my child will be asked a series of questions about their reading interests. In addition, they will have the opportunity to read part of a book that is being considered for purchase in the school library. When information is provided to Mrs. Marinak, it will be recorded anonymously and all identifying information will be changed. Only Mrs. Marinak will have access to the interview and at the completion of the study, all interviews will be destroyed. If a child chooses to withdraw, they will be removed from the study immediately.

All information collected in this study will remain confidential and neither my child's name nor my child's school will be identified or revealed at any time.

I understand that I am free to ask Mrs. Marinak questions about the study at any time. I understand that I can withdraw my child from the study at any time. Should I decide to withdraw my child, no further information will be collected and any information provided to that point will be removed from the study and destroyed.

If I have any questions about the research, I can also contact Dr. Linda Gambrell, Mrs. Marinak's faculty advisor at the University of Maryland. Her phone number is 1-864-656-7656. Her email is lgamb@clemsun.edu.

Parent Signature

Date

APPENDIX F: LIBRARY BOOK ANNOTATIONS

Book Title	Annotation
Cock-A-Doodle-Do	Cock-A-Doodle-Do was written by Janet Stevens and Susan Stevens Crummel. Janet Stevens did the illustrations. It is a fiction book about four funny friends and the treat they cook up together.
Locomotive: Building an Eight Wheeler	Locomotive was written and illustrated by David Weitzman. It is a nonfiction book that explains how an eight-wheeler steam engine is built.
Ghost of the Southern Belle: A Sea Tale	Ghost of the Southern Belle was written by Odds Bodkin and illustrated by Bernie Fuchs. It is a fiction book about a mysterious race between two clipper ships.
ABC Dogs	ABC Dogs was written by Kathy Darling with photographs by Tara Darling. It is a nonfiction book about dogs from the letter A to the letter Z.
Mud Flat Spring	Mud Flat Spring was written and illustrated by James Stevenson. It is fiction book about the adventures of Mud Flat friends one spring day.
Stone Girl, Bone Girl: The Story of Mary Anning	Stone Girl, Bone Girl was written by Laurence Anholt and illustrated by Sheila Moxley. It is a nonfiction book about a young girl who begins finding dinosaur fossils in 1811.

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