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An investigation of agency theory's assumption of strict effort aversion: The role of intrinsic motivation

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An Investigation of Agency Theory's Assumption of Strict Effort Aversion: The Role of Intrinsic Motivation

A Dissertation

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Doctor of Philosophy Degree

The University of Tennessee, Knoxville

M. Cathy Sullivan

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To the Graduate Council:

I am submitting herewith a dissertation written by M. Cathy Sullivan entitled "An Investigation of Agency Theory's Assumption of Strict Effort Aversion: The Role of Intrinsic Motivation." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

A. Faye Borthick, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor
and Dean of The Graduate School

DEDICATION

This dissertation is dedicated to my family. To my sons, Nathan and Josh Klein, thank you. You have been a source of strength and determination, not only throughout the course of this doctoral program, but for the past twenty-two years of my life. Each of you, in your own special way, taught me the wonder of life and the beauty of living every day. I love you both very much.

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ABSTRACT

Agency theory assumes that individuals are effort averse and that extrinsic rewards are necessary to motivate individuals to increase effort and improve performance. This research used a laboratory experiment to challenge agency theory's assumption of strict effort aversion. The organizational psychology literature contains several motivational theories that suggest an individual's intrinsic motivation induces effort exertion even in the absence of external motivation. Specifically, this research examined the relationship between effort and two intrinsic motivation factors, work ethic and need for achievement.

Subjects performed a simple character decoding task designed to elicit effort differences. An increase in effort on an information transfer task of this type should result in improved performance. Therefore, effort was operationalized as performance, measured as productivity and quality.

Subjects were classified as high work ethic or low work ethic individuals based on their individual score on the *Protestant Ethic Scale* (Mirels and Garrett, 1971). Consistent with motivational theories that contend an individual's intrinsic motivation induces voluntary effort exertion when performing a task, high work ethic individuals were more productive and produced higher quality output than low work ethic individuals.

A scale adopted from the *Edwards Personal Preference Schedule* (Edwards, 1983) measured individuals' need for achievement. No difference in productivity or quality existed between high need for achievement individuals and low need for achievement individuals. The task used in the experiment was a very simple one, which may have failed to elicit the intrinsic motivator, need for achievement.

This research also examined how intrinsic motivation factors interact with time pressure to affect job performance. Time pressure significantly affected productivity but had no effect on quality for the task used in this experiment. No interaction existed, however, between the intrinsic motivation factors examined in this study and time pressure. High work ethic individuals were more productive and had higher quality output than low work ethic individuals under no time pressure and under imposed time pressure. No difference in productivity or quality existed between high need for achievement individuals and low need for achievement individuals under either no time pressure or imposed time pressure.

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Chapter 1

Introduction

Agency theory, an analytic theory of contractual relationships, assumes individuals are effort averse and extrinsic rewards are necessary to motivate individuals to increase effort and improve performance. Motivational theories acknowledge an individual's intrinsic motivation and suggest that individuals voluntarily exert effort as they perform their jobs. This research tested agency theory's assumption of strict effort aversion by examining relationships between intrinsic motivation and effort exertion. These relationships are important because they affect employee job performance. The job performance of each individual in an organization is critical for organizational success (Drucker, 1988). Job performance is a function of an individual's willingness to exert effort in performing the job and ability to perform the job (Vroom and Deci, 1970; Locke and Latham, 1990; Weingart, 1992). For example:

> XYZ Company, a wholesale distributer, has seasonal fluctuations in demand for its products. Sales order associates process orders received either by mail or by phone. Like many organizations, XYZ Company hires temporary sales order clerks during periods of high seasonal demand. All temporary employees are screened for ability and are paid the same hourly wage. The department supervisor has noticed significant differences in the performance of the various temporary employees. Some temporary employees process more orders than others. Also, some temporary employees are much more accurate in processing orders than others. The department supervisor wonders why the temporary

> employees perform at different levels because she knows these employees all have comparable ability. Therefore, the supervisor wonders what other factors influence job performance.

Under agency theory's assumption of effort aversion, XYZ Company's temporary employees should all exert minimal effort resulting in equivalent performances. Motivational theories, however, would predict differences in the task performances of XYZ Company's temporary employees because of intrinsic motivation factors.

Researchers have questioned the validity of agency theory's assumption of effort aversion. Jennergren (1980, 190) suggested that an individual who "enjoys challenging work activities" has a positive "marginal utility of effort level." Kaplan (1984, 405) contended that the assumption of effort aversion is inappropriate:

> In practice managers [agents] do not seem to have much effort aversion; frequently the problem is the reverse - they work too long and too hard at their jobs, not too little.

Simon (1990, 661) also challenged the assumption of effort aversion. Simon notes that psychological evidence contradicts the assumption that "people are intrinsically shirkers."

Given the same extrinsic rewards, some individuals exert more effort than others of equivalent ability. One employee carries out assignments diligently while another employee exerts only enough effort to avoid being fired. Also, the propensity to exert effort remains stable over time (Eisenberger, 1989; Greenberg,

1977; Merrens and Garrett, 1975). Intrinsic motivation theories contend that people's thoughts, feelings, and desires regulate their behavior (see Weinberger and McClelland (1990) for a review). The organizational psychology literature contains several motivational theories and empirical studies that suggest an individual's intrinsic motivation induces effort exertion even in the absence of external motivation.

Dillard and Ferris (1989) modeled individual work-related behavior as a function of demographic, cognitive, and environmental factors. Individuals are characterized by various demographic factors such as age, sex, and ability. The cognitive factors are influences inside an individual's mind such as motivation. Environmental factors are external influences in the structure of the work environment (e.g., employment contracts). Hellriegel *et al.* (1986) and Dillard and Ferris (1989) assert that even though demographic and environmental factors impact human behavior, cognitive phenomena, such as intrinsic motivation, are the dominant forces behind variation in effort exertion.

This research tested agency theory's assumption of effort aversion. Specifically, the research examined how two sources of intrinsic motivation, work ethic and need for achievement, affect an individual's propensity to exert effort.

Subjects performed a simple character decoding task designed to elicit effort differences. An increase in effort on an information transfer task of this type

should result in improved performance. Therefore, effort was operationalized as performance. Performance was defined as productivity and quality.

Subjects were classified as high work ethic or low work ethic individuals based on their individual score on the *Protestant Ethic Scale* (Mirels and Garrett, 1971). Consistent with motivational theories that contend an individual's intrinsic motivation induces voluntary effort exertion when performing a task, high work ethic individuals were more productive and produced higher quality output than low work ethic individuals.

A scale adopted from the *Edwards Personal Preference Schedule* (Edwards, 1953) measured individuals' need for achievement. No difference in productivity or quality existed between high need for achievement individuals and low need for achievement individuals. The task used in the experiment was a very simple one, which may have failed to elicit the intrinsic motivator, need for achievement.

This research also examined how intrinsic motivation factors interact with time pressure to affect job performance. Competitive environments increase the time pressure on task performance. Nearly seventy-five percent of the senior executives surveyed by the Gallup Organization cited time pressure as one of the biggest hurdles to quality (Arrington, 1990). Auditors cite time pressure as the primary reason for substandard audit performance (Rhode, 1978; Lightner *et al.*, 1982).

Time pressure significantly affected productivity but had no effect on quality for the task used in this experiment. No interaction existed, however, between the intrinsic motivation factors examined in this study and time pressure. High work ethic individuals were more productive and had higher quality output than low work ethic individuals under no time pressure and under imposed time pressure. No difference in productivity or quality existed between high need for achievement individuals and low need for achievement individuals under either no or imposed time pressure.

The next chapter reviews related prior research and develops the hypotheses. Chapter 3 discusses the research design and methodology used to test agency theory's assumption of effort aversion. The next chapter presents the results of the experiment. Chapter 5 contains a discussion of the research and the last chapter acknowledges the limitations of this research and suggests future research questions.

Chapter 2

Literature Review and Hypotheses Development

First, this chapter reviews the agency theory literature. Next, it reviews the literature and develops hypotheses about the effects of work ethic on effort exertion and the interaction of work ethic with time pressure and how that interaction affects effort exertion. Finally, the chapter reviews the literature and develops hypotheses about the effects of need for achievement on effort and the interaction of need for achievement with time pressure and how that interaction affects effort exertion.

Effort is the amount of physical and mental energy expended (Vroom, 1964) and has two components: duration and intensity (Locke and Latham, 1990; Weingart, 1992; Libby and Lipe, 1992). Duration is the total time spent working, and intensity is the number of task-relevant acts performed per unit of time. An increase in either duration or intensity constitutes an increase in effort (Locke and Latham, 1990; Weingart, 1992; Libby and Lipe, 1992). An increase in effort should increase the number and quality of task-relevant acts performed. In this research, effort was operationalized as productivity and quality. Therefore, separate hypotheses were developed for productivity and quality.

2.1 Agency Theory

An agency agreement is an explicit or implicit contractual relationship between a principal and an agent that exerts effort on behalf of the principal (Jensen and Meckling, 1976). The employer/employee relationship contains important facets of agency theory (Baiman, 1982). In an employment contract, an employee (agent) agrees to exert effort for the benefit of the employer (principal) in exchange for extrinsic rewards.

The agency theory model assumes that self-interest motivates each party to the contract and that individuals are effort averse (Ross, 1973; Jensen and Meckling, 1976; Holmström, 1979; Baiman, 1982). The model further assumes that agents possess effort-relevant private information (i.e., the agents know how much effort they intend to exert). Together, the agents' disutility for effort and this information asymmetry result in a moral hazard problem. The self-interested agent is assumed to be highly motivated to exert less effort than the principal desires. Because the actions of the agent are unobservable, the agent will exert minimal effort and thereby reduce the welfare of the principal (Holmström, 1979; Baiman, 1982).

Agency theory research proposes several alternative solutions for inducing an agent to exert effort on behalf of the principal. One solution focuses on the use of economic inducements to motivate individuals to increase effort and improve

performance (Jensen and Meckling, 1976; Holmström, 1979; Baker *et al.*, 1988). The agency theory model assumes that rewards contingent on performance motivate individuals to increase effort and improve performance (Jensen and Meckling, 1976; Holmström, 1979; Baker *et al.*, 1988).[1] Alternatives to rewards contingent on performance include information and monitoring systems that continually reveal the agent's effort decision (Harris and Raviv 1978; Shavell, 1979; Holmström, 1979; Baiman and Demski, 1980) and systems that randomly audit the agent's effort decision (Itami, 1975; Demski and Feltham, 1978; Christensen, 1982; Baiman and Evans, 1983; Penno, 1984, 1990).

The agency theory model of human behavior ignores intrinsic motivation factors that affect effort exertion. Motivational theories acknowledge an individual's intrinsic motivation. These theories would suggest that an agent will voluntarily exert effort on behalf of the principal. Two sources of intrinsic motivation are work ethic and need for achievement. This research examined whether or not an individual's work ethic and need for achievement are associated with voluntary effort exertion.

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[1]Most compensation plans, however, are not performance based (Baker *et al.*, 1988). Even in organizations that claim to have a merit system, compensation often does not relate very closely to performance (Lawler, 1971).

2.2 Work Ethic

The work ethic concept, which originated during the Protestant Reformation and the subsequent rise of the Puritan movement, is a belief system that regards labor as the highest form of Christian obedience (Weber, 1958, Mudrack, 1992). Work ethic, no longer considered the domain of Protestantism, is an individual trait thought to exert a significant influence on job performance (Furnham, 1989). For individuals with a high work ethic, satisfaction from work represents an intrinsic reward. These individuals tend to be productive and take pride in high quality work (Cherrington, 1980).

Work ethic is a learned motivational trait, developed through discipline, control, and initiative. Research shows that employees with a high work ethic tend to come from backgrounds that support self-discipline, self-control and initiative, and that reinforce high performance (Cherrington, 1980; Eisenberger, 1989). Work ethic development begins during childhood but continues in adulthood and is influenced on the job (Cherrington, 1980; Eisenberger, 1989).

Individuals with a high work ethic tend to exert high levels of effort when performing tasks (Eisenberger *et al.*, 1982). Greenberg (1977) and Merrens and Garrett (1975) found that individuals with a high work ethic work harder and persist longer at repetitive and monotonous tasks than individuals with low work

ethic. Table 1[2] summarizes prior empirical research related to work ethic. For each study, the table includes the author, the number of subjects and the significant finding.

Researchers have not empirically tested the impact of work ethic on effort exertion for a specified time period. In a practical setting, however, individuals usually have no choice in how long they perform a task. A supervisor (or the task) determines how long the individual performs the task. Therefore, determining the impact of work ethic on productivity (the amount of output per unit of time) and performance quality for a specified time period is worthwhile. Given a specified time period, the positive effects of high work ethic on task performance should also be apparent. The following hypotheses, stated in the alternative form, examine whether or not high work ethic subjects are more productive and have higher quality output than low work ethic subjects when performing a task for a specified time period:

H_1 Subjects with a high work ethic will be more productive than subjects with a low work ethic.

[2]All tables and figures can be found in Appendixes A and B respectively.

H_2 Subjects with a high work ethic will produce higher quality output than subjects with a low work ethic.

2.2.1 Work Ethic and Time Pressure. Schuler (1980) classified time pressure as a constraint stress, an externally imposed condition that prohibits an individual from doing what the individual desires. Sales (1969) found that productivity increased but quality decreased when individuals performed a task under time pressure. McDaniel (1990) found the same results in an audit environment. As time pressure increased, audit efficiency (i.e., productivity) increased, but audit effectiveness (i.e., quality) decreased. (See Table 1 for a summary of prior empirical research related to time pressure.)

This researcher could find no studies that examined how time pressure interacts with work ethic. Prior research, however, suggests that high work ethic individuals work harder than low work ethic individuals at any task. Therefore, no interaction between work ethic and time pressure is expected. The same relationships between work ethic and productivity and quality are expected under time pressure as under no time pressure:

H_3 Subjects with a high work ethic will be more productive under imposed time pressure than subjects with a low work ethic.

H_4 Subjects with a high work ethic will produce higher quality output under imposed time pressure than subjects with a low work ethic.

2.3 Need for Achievement

A person's needs also provide intrinsic motivation (McClelland *et al.*, 1953; Carver and Scheier, 1981). McClelland *et al.* (1953), Biernat (1989) and Cooper (1983) found that need for achievement, a learned motivational trait, is an intrinsic motivator. McClelland *et al.* (1953, 228) defined need for achievement as "a concern with doing things better, with surpassing standards of excellence." McClelland and Liberman (1949) found that individuals with a high need for achievement need to experience feelings of accomplishment and success.[3] Studies have found that individuals with a high need for achievement prefer tasks of intermediate difficulty, while individuals with a low need for achievement prefer

[3]Although certain concepts of work ethic and need for achievement are similar, they are not identical. While individuals with a high work ethic work hard and efficiently at any task more or less indiscriminately, individuals with a high need for achievement prefer tasks that tend to give them a sense of personal accomplishment (McClelland, 1976).

extremely easy or extremely difficult tasks (see Atkinson and Raynor, 1974; Weiner, 1980).

Lowell (1952) found that individuals with a high need for achievement had a steeper learning curve (i.e., learned more, faster) and were more productive than individuals with a low need for achievement. Wendt (1955) found that individuals with a high need for achievement directed more attention and effort to a task than individuals with a low need for achievement. More recently, Puffer (1989) found that, without deadlines, students with a high need for achievement completed tasks later than individuals with a low need for achievement. She suggested that high achievers took longer to ensure good performance. (See Table 1 for a summary of prior empirical research related to need for achievement.)

Early research suggests that individuals with a high need for achievement are more productive and more accurate when performing a task than individuals with a low need for achievement. Consequently, the following hypotheses, stated in the alternative form, examine whether or not high need for achievement subjects are more productive and have higher quality output than low need for achievement subjects when performing a task for a specified time period:

H_5 Subjects with a high need for achievement will be more productive than subjects with a low need for achievement.

H_6 Subjects with a high need for achievement will produce higher quality output than subjects with a low need for achievement.

2.3.1 Need for Achievement and Time Pressure. Wendt (1955) examined the interaction between time pressure and need for achievement. He found that, without time pressure, individuals with a high need for achievement were more productive than individuals with a low need for achievement. Under time pressure, however, subjects with a low need for achievement increased productivity more than subjects with a high need for achievement. Consequently, under time pressure, no significant difference in productivity existed between high and low need for achievement subjects. The study also showed a positive relationship between need for achievement and output accuracy when time pressure was absent. Under time pressure, all subjects decreased their accuracy. High need for achievement individuals, however, still performed more accurately than low need for achievement individuals. Beh (1989) also examined the interaction of time pressure and need for achievement on task performance: under time pressure, toward the end of a task, subjects with a high need for achievement increased speed of

performance but not performance accuracy. Subjects with a low need for achievement showed no change in performance speed or accuracy (see Table 1).

The following hypothesis, in the alternative form, proposes an interaction effect between need for achievement and time pressure on productivity. Although under no time pressure, individuals with a high need for achievement are expected to be more productive than individuals with a low need for achievement, under imposed time pressure, no difference in productivity is expected:

H_7 Under imposed time pressure, no difference in productivity exists between subjects with a high need for achievement and subjects with a low need for achievement.

Wendt (1955) and Beh (1989) found that time pressure decreased accuracy for all individuals regardless of their need for achievement. Therefore, no interaction is expected between need for achievement and time pressure on quality. If this research supports H_4, individuals with a high need for achievement should still perform more accurately than individuals with a low need for achievement under imposed time pressure. The following hypothesis, stated in the alternative form, will be tested:

H_8 Under imposed time pressure, subjects with a high need for achievement will produce higher quality output than subjects with a low need for achievement.

Chapter 3

Research Design and Methodology

This chapter discusses the research design and the methodology used in testing agency theory's assumption of effort aversion.

3.1 Research Design

A laboratory experiment was used to examine the relationships between productivity and quality and an individual's work ethic and need for achievement. The experiment also examined how an individual's work ethic and need for achievement interact with time pressure to affect productivity and quality. This section discusses subjects, the experimental task, pretest administration and the task procedure.

3.1.1 Subjects. This research investigated agency theory's assumption of strict effort aversion. The research examined the general relationships between (1) work ethic and effort exertion and (2) need for achievement and effort exertion. Work ethic and need for achievement influence any person engaged in an agency

relationship. Therefore, students were considered appropriate subjects for the experiment.

A total of 739 undergraduate college students participated in the experiment. The subjects were all enrolled in an introductory financial accounting course at a major state university. Subjects who participated in the experiment were awarded five additional points on their first exam. The 371 females and the 368 males had an average age of 21. Table 2 summarizes additional demographic information related to the 739 participants.

3.1.2 The Experimental Task. After reading an informed consent form (Appendix C), subjects performed a simple character decoding task (Appendix D) adopted from Chow (1983) and Chow *et al.* (1988). The task was not designed to mimic any particular real-world setting, but to induce the effort differences that exist in real-world tasks. The task was an information transfer task such that an increase in effort should result in improved performance (Humphreys and Revelle, 1984).

3.1.3 Pretest Administration. Several pretests were conducted to determine (1) the time necessary to administer the entire experiment, (2) the optimal sequencing of the task procedures, (3) the time necessary for subjects to learn the

task and (4) the number of items subjects could decode in a fifteen minute time segment.

Pretest results indicated that the entire experiment required 45 to 50 minutes to complete. Subjects performed the experimental task and an ability test. The ability test was a clerical speed and accuracy test. Performing the experimental task before completing the ability test resulted in more task variance. Subjects were instructed to perform the ability test as quickly and accurately as possible. When subjects took the ability test prior to completing the task, they inferred the same instructions for the task. Pretest results indicated that subjects learned the task procedure in fifteen minutes. Subjects decoded an average of 85 series of characters during a fifteen minute time segment on the pretest with a standard deviation of 16.5. These results indicated that 150 series of characters were required on the task instrument to ensure subjects perceived the time pressure manipulation.

3.1.4 Task Procedure. The experiment was administered during the class period following the first exam. Each subject read the informed consent form prior to completing the task. The consent form indicated that performance of the task constituted consent. Because learning ceased after fifteen minutes, subjects

performed the task for two fifteen minute time segments: performance during the last fifteen minute segment was considered in the experiment.

After performing the task, subjects completed instruments that measured work ethic (Appendix E) and need for achievement (Appendix F). Next, they completed a post-task questionnaire (Appendix G) designed to collect demographic information. Finally, subjects performed the aptitude test used to measure ability (Appendix H).

3.2 METHODOLOGY

This section discusses the experimental design, variables of interest, statistical methods and model specification.

3.2.1 Experimental Design. The experiment consisted of two separate two-factor nonequivalent post-test only control group designs (Campbell and Stanley, 1963). Analyses were performed to test for homogeneity between subjects in the two nonequivalent groups (Campbell and Stanley, 1963).

3.2.2 Variables. The empirical models in this research contained one of two response variables, two classification factors and an experimental factor. Prior research suggests that performance-based rewards can harm, improve, or have no

effect on performance (see Hogarth *et al.* (1991) for a review). Therefore, this research excluded performance-based rewards in order to isolate the effects of an individual's intrinsic motivation on effort exertion.

3.2.2.1 Response Variables. The response variables were productivity and quality. Job performance is a function of an individual's willingness to exert effort in performing the job and ability to perform the job (Vroom and Deci, 1970; Locke and Latham, 1990; Weingart, 1992). The analysis controlled for ability as measured by Bennett *et al.*'s, (1982) clerical speed and accuracy measurement (Appendix H). Effort was operationalized as productivity and quality. Productivity was defined as the number of series of characters decoded by the subject during the last fifteen minute segment of the task. Quality was the percent of the characters the subject decoded accurately.

3.2.2.2 Classification Factors. The two classification factors were work ethic and need for achievement, which were analyzed separately. The research did not examine any relationship between work ethic and need for achievement. The instruments measuring work ethic and need for achievement were labeled "Preference Profile" to disguise which intrinsic motivation traits were being measured.

The Protestant Ethic Scale (Mirels and Garrett, 1971) (Appendix E) measured the subject's work ethic. Descriptive statistics of the *Protestant Ethic Scale'* scores indicated an overall mean (standard deviation) of 85.37 (11.98). The 75th and 25th percentiles were 93 and 77 respectively. The 203 subjects with work ethic scores at or above the 75th percentile were classified as high work ethic individuals. One hundred eighty six subjects had work ethic scores at or below the 25th percentile and were classified as low work ethic individuals (see Figure 1). High work ethic and low work ethic scores were coded as a one and zero respectively to identify the two factor levels for work ethic. The remaining 518 subjects (those individuals with work ethic scores between the 25th and 75th percentile) were not used in the analysis to test how work ethic is related to effort.

The instrument used to measure need for achievement was adopted from *The Edwards Personal Preference Schedule* (EPPS) (Edwards, 1953). The questionnaire consisted of thirty-five forced choice items from the EPPS that included the twenty-eight items concerned with need for achievement (Appendix F). Analysis of the need for achievement variable indicated an overall mean (standard deviation) of 14.40 (4.06). The 75th and 25th percentiles were 17 and 12 respectively. Two hundred twenty subjects were at or above the 75th percentile. These subjects were classified as high need for achievement individuals. Another 246 subjects were at or below the 25th percentile and were classified as low need for achievement

individuals (see Figure 2). High need for achievement and low need for achievement scores were coded as one and zero respectively to identify the two factor levels for need for achievement. The remaining 273 subjects were not used in testing the effect of need for achievement on effort exertion.

3.2.2.3 Experimental Factor. The manipulated experimental factor, time pressure, had two levels: no time pressure and imposed time pressure. Subjects in the no time pressure group performed the task for the two fifteen minute time periods without any direction from the task administrator. Subjects in the imposed time pressure group performed the task for the first fifteen minute time segment without any direction from the task administrator. To manipulate time pressure, these subjects were then directed to decode 135 series of characters (three standard deviations above the mean of the pretest results) during the second fifteen minute time segment. Five and ten minutes into the second fifteen minute time period, subjects were admonished to work as quickly as possible. Subjects responded to a five-point scale that identified the degree of time pressure experienced while performing the task. Group means on this scale were compared to determine whether subjects perceived the time pressure manipulation.

3.2.3 Statistical Methods. To determine whether separate analyses of variance or a multivariate analysis of variance was the appropriate statistical analysis, the relationship between the response variables, productivity and ability, was examined with Pearson correlation coefficients. Pearson correlation coefficients were also used to examine the relationships between ability, the potential covariate, and the response variables.

A two-sample *t*-test was used to compare the ability of high work ethic and low work ethic individuals. The ability of high need for achievement and low need for achievement subjects was also compared using a two-sample *t*-test. These *t*-tests were performed to confirm equivalent ability between individuals with different levels of work ethic and different levels of need for achievement,

3.2.4 Model Specification. Two 2x2 complete factorial models were used to evaluate the research hypotheses for each classification factor, work ethic and need for achievement. The models for the classification factor work ethic, written in regression form (Neter *et al.*, 1990), are:

$$Productivity = \mu+\beta_1 WE+\beta_2 TP+\beta_3(WE)(TP)+\beta_4 AB+\varepsilon$$

$$Quality = \mu+\beta_1 WE+\beta_2 TP+\beta_3(WE)(TP)+\beta_4 AB+\varepsilon$$

The models for the classification factor need for achievement, written in regression form, are:

$$Productivity = \mu+\beta_1 NA+\beta_2 TP+\beta_3(NA)(TP)+\beta_4 AB+\varepsilon$$

$$Quality = \mu+\beta_1 NA+\beta_2 TP+\beta_3(NA)(TP)+\beta_4 AB+\varepsilon$$

where

μ	=	model intercept,
β_i	=	parameter estimates for each factor,
WE	=	work ethic,
TP	=	time pressure,
NA	=	need for achievement,
AB	=	ability, and
ε	=	model error.

Chapter 4

Results

Results of the manipulation check, verification of subject homogeneity between the two nonequivalent groups, analysis of the relationships among the model variables and the results of the tests of hypotheses are presented in this chapter. In the last section of the chapter other interesting results that were not hypothesized are presented.

4.1 Manipulation Check

To confirm the time pressure manipulation, subjects were asked to identify on a five-point scale how much time pressure they felt in completing the task. The five points on the scale were: (1) none, (2) very little, (3) moderate, (4) substantial and (5) extreme. Subjects that performed the task with no time pressure had a mean (standard deviation) amount of time pressure in completing the task of 2.83 (1.05). Subjects that performed the task under imposed time pressure had a mean (standard deviation) amount of time pressure in completing the task of 3.23 (0.98). The difference in time pressure felt by the two groups was statistically significant (t

= -5.2491, $p < .0001$). These results indicated that the time pressure manipulation was successful.

4.2 Homogeneity of Subjects

Work ethic and need for achievement scores for subjects in the no time pressure and the imposed time pressure groups were compared. Results indicated homogeneity between subjects in the two nonequivalent groups for work ethic (t = -1.4195, p = .1562) and need for achievement (t = .5498, p = .5828). Work ethic means (standard deviations) for the no time pressure and imposed time pressure groups were 84.75 (12.02) and 85.99 (11.92) respectively. Need for achievement means (standard deviations) for the no time pressure and imposed time pressure groups were 14.48 (4.21) and 14.32 (3.92) respectively.

Results of t-tests also indicated no significant demographic differences between the no time pressure and imposed time pressure groups. Subjects were homogeneous with respect to age (t = -.1550, p = .8768), amount of post-secondary education (t = .7916, p = .4289), gender (X^2 = .002, p = .964), and ethnic background (X^2 = 2.323, p = .677) (see Table 3).

Two-sample t-tests indicated equivalent ability, as measured by the clerical speed and accuracy test, between high work ethic and low work ethic individuals (t

= -.20, p = .84) and high need for achievement and low need for achievement (t = 1.13, p = .26) subjects.

4.3 Relationships of Model variables

Overall descriptive statistics for all variables in the study (before the bifurcation) are presented in Table 4. Table 5 presents Pearson correlation coefficients (before bifurcation). The Pearson correlation coefficients indicated: (1) a weak but significant correlation between the two response variables, productivity and quality (r = .1727)[4], (2) a moderate correlation between ability and productivity (r = .4353), (3) no systematic relationship between ability and quality (r = .0166) and (4) an insignificant correlation between work ethic and need for achievement (r = .1070). Because of the insignificant correlation between the response variables, separate analyses of variance (ANOVAs), rather than a multivariate analysis of variance (MANOVA), on productivity and quality were deemed appropriate. Ability was included as a covariate in the models that contained productivity as the response variable because of the moderate correlation between ability and productivity; the models were analyzed using an analysis of covariance (ANCOVA). Because no systematic relationship existed between ability

[4]A correlation of .1727 is of practical insignificance. The large sample size used in this study (N = 739), however, causes a significant p-value (.001). This significance level must be interpreted with caution.

and quality, the models that contained quality as the response variable excluded the covariate ability and were analyzed using an analysis of variance (ANOVA).

4.4 Test of Hypotheses

The analysis of covariance and analysis of variance procedures were performed using a general linear model. Type three sums of squares were used to adjust for the unbalanced designs. The two classification factors, work ethic and need for achievement, were analyzed separately. The research did not examine any relationship between work ethic and need for achievement.

4.4.1 Work Ethic. Results of the analyses indicated that high work ethic individuals exerted more effort when performing a task than low work ethic individuals. These results held under no time pressure and under imposed time pressure. Table 6 presents a summary of the overall model fit for the two models (response variables productivity and quality) related to work ethic.

4.4.1.1 Work Ethic and Productivity. Hypothesis 1, that subjects with a high work ethic will be more productive when performing a task than subjects with a low work ethic, was tested using an ANCOVA. The ANCOVA disclosed a significant main effect for work ethic (see Table 7). High work ethic subjects

decoded significantly more series of characters than low work ethic subjects (F = 3.95, df = 1, p = .0475, ω^2 = .01)[5]. Productivity least squares means[6] (standard error of the least squares means) were 90.14 (1.27) and 86.49 (1.32) for the high work ethic and low work ethic subjects respectively.

Hypothesis 3, that subjects with a high work ethic will be more productive when performing a task under imposed time pressure than subjects with a low work ethic was also supported. Whether subjects performed the task under no time pressure or under imposed time pressure, high work ethic subjects decoded significantly more series of characters than low work ethic subjects. Although the ANCOVA results indicated a significant main effect for time pressure, i.e., subjects under imposed time pressure were more productive than subjects under no time pressure, no significant interaction existed between work ethic and time pressure on productivity (F = 2.88 df = 1, p = .0904, ω^2 = .00).[7] Productivity least squares means (standard error of the least squares means) were 90.81 (1.30) and 85.825

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[5]ω^2 represents the strength of the association represented by significant treatment or interaction effects (Hays, 1973).

[6]Least squares means are arithmetic means adjusted for effects of the covariate and for the unbalanced design (SAS, 1990).

[7]An analysis of variance model that omitted the covariate ability moderately supported hypothesis 1 (F = 4.22 df = 1, p = .07) and supported hypothesis 3 (F = 1.74 df = 1, p = .19). A multiple regression analysis using the work ethic score from all 739 subjects as a continuous variable resulted in an overall model p-value of .0001. Work ethic had a p-value of .13. The amount of time pressure felt by the subject was also included as an independent variable and was significant at p = .0002.

(1.31) for subjects under imposed time pressure and no time pressure respectively. Under imposed time pressure, productivity least squares means (standard error of the least squares means) were 94.19 (1.74) and 87.43 (1.92) for the high work ethic and low work ethic subjects respectively. Under no time pressure, productivity least squares means (standard error of the least squares means) were 86.09 (1.85) and 85.56 (1.83) for the high work ethic and low work ethic subjects respectively. Figure 3 reports the least squares means productivity scores for high and low work ethic subjects under no and imposed time pressure. Figure 4 graphs the least squares means productivity scores for high and low work ethic subjects under no time pressure and imposed time pressure.

4.4.1.2 Work Ethic and Quality. Hypothesis 2 predicted that subjects with a high work ethic will produce higher quality output when performing a task than subjects with a low work ethic. Results from an ANOVA to determine the effects of work ethic and time pressure on quality supported hypothesis 2 (see Table 8). The results of the ANOVA disclosed a significant main effect for work ethic (F = 8.76, df = 1, p = .0033, ω^2 = .02). High work ethic subjects correctly decoded a significantly higher percentage of series of characters than low work ethic subjects. Quality least squares means (standard error of the least squares means) for high

work ethic and low work ethic subjects were .925 (.006) and .90 (.006) respectively.

Hypothesis 4, that subjects with a high work ethic will produce higher quality output when performing a task under imposed time pressure than subjects with a low work ethic, was also supported (see Table 8). ANOVA results indicated that time pressure had no effect on quality, i.e., no difference in the quality of work produced existed between those subjects not under time pressure and those subjects under imposed time pressure. Quality least squares means (standard error of the least squares means) were .91 (.006) and .915 (.006) for subjects under imposed time pressure and no time pressure respectively. In addition, no significant interaction existed between work ethic and time pressure on quality ($F = 2.53$, $df = 1$, $p = .1127$, $\omega^2 = .00$).[8] Whether subjects performed the task under imposed time pressure or no time pressure, high work ethic subjects accurately decoded significantly more series of characters than low work ethic subjects. Under imposed time pressure, quality least squares means (standard error of the least squares means) for high work ethic and low work ethic subjects were .92 (.009) and

[8]An analysis of covariance model that included the covariate ability also supported hypotheses 2 ($F = 8.75$ $df = 1$, $p = .003$) and 4 ($F = 2.46$ $df = 1$, $p = .12$).

A multiple regression analysis using the work ethic score from all 739 subjects as a continuous variable resulted in an overall model p-value of .0003. Work ethic had a p-value of .0005. The amount of time pressure felt by the subject was also included as an independent variable and was significant at $p = .03$.

.90 (.009) respectively. Under no time pressure, quality least squares means (standard error of the least squares means) were .93 (.009) and .90 (.009) for the high work ethic and low work ethic subjects respectively. See Figure 5 and Figure 6 for the least squares means quality scores and graphs for high and low work ethic subjects under no time pressure and imposed time pressure.

4.4.2 Need for Achievement. Analyses of the results showed no differences in the amount of effort exerted by high need for achievement individuals and low need for achievement individuals for this task. These results were consistent whether the subjects performed the task under no time pressure or imposed time pressure. Table 9 presents a summary of the overall model fit for the two models (productivity and quality) related to need for achievement.

4.4.2.1 Need for Achievement and Productivity. Hypothesis 5, that subjects with a high need for achievement will be more productive when performing a task than subjects with a low need for achievement, was not supported (see Table 10). An ANCOVA to determine the effects of need for achievement and time pressure on productivity disclosed no main effect for need for achievement ($F = .41$, $df = 1$, $p = .5220$, $\omega^2 = .00$). Productivity least squares means (standard error of the least

squares means) for high need for achievement and low need for achievement subjects were 88.06 (1.2) and 89.11 (1.13) respectively.

Hypothesis 7 proposed that under imposed time pressure, no differences in productivity exist between subjects with a high need for achievement and subjects with a low need for achievement. The results appear to support hypothesis 7. Under imposed time pressure, no difference existed in the productivity of high need for achievement individuals and low need for achievement individuals. Productivity least squares means (standard error of the least squares means) for high need for achievement and low need for achievement subjects were 91.73 (1.73) and 92.62 (1.59) respectively. The *a priori* hypotheses, however, were that (1) high need for achievement subjects would be more productive than low need for achievement subjects under no time pressure (hypothesis 5) and (2) low need for achievement subjects would increase productivity more than high need for achievement subjects (hypothesis 7). Thus, *a priori*, given support of hypothesis 5, an interaction between need for achievement and time pressure was hypothesized. Hypothesis 5 was not supported, however, and there was no significant interaction between need for achievement and time pressure on productivity ($F = .01$, $df = 1$ $p = .9201$, $\omega^2 = .00$). Although ANCOVA results indicated a significant main effect for time pressure, i.e., subjects under imposed time pressure were more productive than subjects not under time pressure, high need for achievement subjects were no more

productive than low need for achievement subjects under imposed time pressure or no time pressure. Under imposed time pressure, productivity least squares means (standard error of the least squares means) were 91.73 (1.73) and 92.62 (1.59) for the high need for achievement and low need for achievement subjects respectively. Under no time pressure, productivity least squares means (standard error of the least squares means) were 84.38 (1.68) and 85.60 (1.63) for the high need for achievement and low need for achievement subjects respectively. Figure 7 reports the least squares means productivity scores for high need for achievement and low need for achievement subjects under no and imposed time pressure. Figure 8 graphs the least squares means productivity scores for high and low work need for achievement subjects under no time pressure and imposed time pressure.

4.4.2.2 Need for Achievement and Quality. Hypothesis 6, that subjects with a high need for achievement will produce higher quality output when performing a task than subjects with a low need for achievement, was not supported. Results from an ANOVA to determine the effects of need for achievement on quality disclosed no main effect for need for achievement ($F = .01$, $df = 1$, $p = .9114$, $\omega^2 = .00$) (see Table 11). Quality least squares means (standard error of the least squares means) were .92 (.005) for both high need for achievement and low need for achievement subjects.

Hypothesis 8, that under imposed time pressure, subjects with a high need for achievement will produce higher quality output when performing a task than subjects with a low need for achievement, was not supported. Under imposed time pressure, quality least squares means (standard error of the least squares means) were .92 (.008) for both high need for achievement and low need for achievement subjects. The analysis indicated that time pressure had no effect on quality (F = .03, df = 1, p = .8701, ω^2 = .00), i.e., no difference in the quality of work produced existed between those subjects not under time pressure and those subjects under imposed time pressure. In addition, no significant interaction existed between need for achievement and time pressure on quality (F = .03 df = 1, p = .8623, ω_2 = .00). See Figure 9 and Figure 10 for the least squares means quality scores and graphs for high and low need for achievement subjects under no time pressure and imposed time pressure.

4.5 Additional Analyses

Increased global competition has resulted in an emphasis on quality and a goal of zero defects for many entities. Hayes (1981) estimated that decreasing defects two percent results in a ten percent increase in productivity. Therefore, additional analyses were performed in this research defining productivity as zero defects, i.e., the number of series of characters correctly decoded by the subject.

4.5.1 Work Ethic. An analysis of covariance indicated that high work ethic subjects decoded significantly more series of characters correctly than low work ethic subjects ($F = 7.45$, $df = 1$, $p = .006$). Productivity least squares means (standard error of the least squares means) were 83.80 (1.37) and 78.37 (1.43) for the high work ethic and low work ethic subjects, respectively. Although time pressure was marginally significant for productivity defined as zero defects ($F = 3.43$, $df = 1$, $p = .065$), no interaction existed between work ethic and time pressure ($F = .60$, $df = 1$, $p = .440$).

4.5.2 Need for Achievement. No differences existed between high and low need for achievement individuals for productivity defined as zero defects. This finding is consistent with the results that failed to support the original hypotheses related to need for achievement.

Chapter 5

Discussion

This research tested agency theory's assumption of strict effort aversion in a laboratory experiment. The research examined whether or not an individual's intrinsic motivation induced effort exertion even in the absence of external motivation. Specifically, the experiment examined the relationship between two intrinsic motivation factors, work ethic and need for achievement, and effort. The experiment also examined how effort exertion is affected by time pressure and the interactions between time pressure and an individual's work ethic and need for achievement.

This chapter presents a discussion of the research findings and contributions of the research to the accounting literature. The hypotheses and results of analyses are summarized in Table 12.

5.1 Work Ethic

Prior research found that individuals with a high work ethic tend to exert high levels of effort when performing tasks (Eisenberger *et al.*, 1982). These individuals work harder and persist longer at repetitive and monotonous tasks than

individuals with a low work ethic (Greenberg 1977; Merrens and Garrett 1975). Because individuals usually have no choice in how long they perform a task, this research examined the effect of an individual's work ethic on effort exertion for a specified time period.

Under no time pressure and under imposed time pressure, high work ethic individuals were more productive and produced higher quality output than low work ethic individuals when performing a task. Productivity for both high and low work ethic individuals increased when subjects performed the task under imposed time pressure rather than under no time pressure. Quality, however, remained constant under no time pressure and imposed time pressure for both high and low work ethic individuals.

The positive relationship between work ethic, a source of intrinsic motivation, and effort exertion is not consistent with agency theory's assumption of strict effort aversion. The findings support motivational theories that suggest an individual's intrinsic motivation induces effort exertion even in the absence of external motivation.

5.2 NEED FOR ACHIEVEMENT

A person's needs also provide intrinsic motivation (McClelland *et al.*, 1953; Carver and Scheier, 1981). Need for achievement is one such intrinsic motivator (McClelland *et al.* 1953; Biernat 1989; Cooper 1983). Early researchers (Lowell 1952; Wendt 1955) found that individuals with a high need for achievement directed more effort and attention to a task than individuals with a low need for achievement. Therefore, high need for achievement individuals were more productive and more accurate when performing a task than low need for achievement individuals. In this experiment, however, hypotheses five and six, that subjects with a high need for achievement will be more productive and produce higher quality output than subjects with a low need for achievement, were not supported. Failure to support these hypotheses may be due to the task used in the experiment. The task probably did not elicit an achievement motivation. Prior studies have found that individuals with a high need for achievement prefer tasks of intermediate difficulty, while individuals with a low need for achievement prefer extremely easy or extremely difficult tasks (see Atkinson and Raynor, 1974; Weiner, 1980). The task in this experiment was extremely easy; in fact, low need for achievement individuals were more productive than high need for achievement individuals. The difference, however, was not statistically significant. Quality of output was identical for high and low need for achievement individuals. Both the

productivity results and the quality results were consistent under no and imposed time pressure.

These findings showed no differences in effort exertion between high and low need for achievement individuals for this task. Another task, however, may have elicited differences in the amount of effort exerted by high and low need for achievement individuals.

5.3 Contributions

Although many researchers have described the agency theory model in various ways (Harris and Raviv 1978; Demski and Feltham 1978; Shavell 1979; Holmström 1979), they all accept a trade off between (a) the cost of measuring behavior and (b) the cost of measuring outcomes which transfers risk to the agent (Eisenhardt, 1989). Therefore, agency theory research proposes several alternative solutions for inducing an agent to exert effort on behalf of the principal. These alternatives include various compensation schemes, information and monitoring systems, and random effort audits (Harris and Raviv 1978; Demski and Feltham 1978; Shavell 1979; Holmström 1979; Baiman and Demski 1980; Christensen 1982; Baiman and Evans 1983; Penno 1984, 1990). These solutions, however, involve significant costs to an organization. Incurring costs to induce an agent to exert

effort on behalf of the principal may not result in the anticipated outcome.[9] In fact, Baiman (1982), Namazi (1985) and Penno (1990) conclude that cost-benefit analyses fail to unequivocally establish the positive value of these possible solutions.

The results of this research suggest an extension to the simple agency model that accepts a trade off between the cost of measuring behavior and the cost of measuring outcomes. By relaxing the assumption of strict effort aversion, researchers can focus on the risk-sharing considerations in a principal-agent relationship rather than solutions for inducing an agent to exert effort on behalf of the principal.

Relaxing the assumption of strict effort aversion would also allow researchers to apply the agency theory model to more complex agency relationships. For example, the organizational structure of the future will likely include task-focused teams (Drucker, 1988). Relaxing the assumption of strict effort aversion might let researchers extend the agency theory model to team structures.

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[9]For example, Libby and Lipe (1992) found that the impact of monetary incentives on effort depends on the task structure, the expertise of the individual, and the existing level of incentives. Awasti and Pratt (1990) found that the impact of monetary incentives on effort depends on an individual's perceptual differentiation.

This research suggests that agents are not effort averse and, in fact, suggests that an agent's propensity to exert effort may be measurable and quantifiable. The results of this research suggest that intrinsic motivation factors should be incorporated in the agency theory model. If the intrinsic motivation factors were identified and incorporated into the agency theory model, managerial accounting procedures could place less emphasis on monitoring. An agent's intrinsic motivation could be measured and identified and principal-agent contracts could be designed for an assumed level of effort exertion rather than focusing on monetary incentives that induce the agent to exert effort.

Chapter 6

Limitations and Extensions

This chapter discusses potential limitations and extensions of the research.

6.1 Limitations

Although nonequivalent groups were randomly assigned to either the time pressure or no time pressure group, randomization of individual subjects would increase internal validity. Results of tests, however, indicated homogeneity of subjects between groups.

Methodological limitations such as experiment effects and evaluation apprehension may bias the results. The character decoding task was administered before the aptitude test to limit bias resulting from experimental effects. Subjects were assured of confidentiality and therefore evaluation apprehension bias should be limited.

This study did not consider monetary incentives. Because in a practical setting individuals are paid for effort exertion, generalizability may be limited. Libby and Lipe (1992), however, contend that, if monetary incentive effects are independent of the cognitive attribute of interest, generalizability of the results of

the study are not limited. Prior research suggests that work ethic and need for achievement are both independent of monetary incentives. Therefore, ignoring monetary incentives should not have biased the results.

The experimental task and the experimental setting, rather than a real work environment, may limit generalizability. Subjects, however, should exhibit less effort averse tendencies in a thirty minute laboratory experiment than in an eight hour work day. Also, many work related tasks are more challenging than this experimental task. Therefore, the results of the experiment should be conservative.

The lack of support for a relationship between need for achievement and productivity and quality needs to be interpreted with caution. Individuals with a high need for achievement prefer tasks that tend to give them a sense of personal accomplishment. This task probably did not elicit an achievement motivation. Another task, however, might support a relationship between need for achievement and productivity and quality.

6.2 Potential Extensions

This research examined the relationship between two intrinsic motivation factors, work ethic and need for achievement, and effort exertion. The task used in this experiment was a monotonous repetitive task. In a practical setting many tasks are not as mundane as the task in this experiment. Therefore, future research

should examine these relationships under different task scenarios and different levels of task difficulty.

Research examining the effects of extrinsic rewards on effort exertion has been inconclusive. Recently researchers have attempted to identify various factors that affect the impact of monetary incentives on effort exertion (e.g., Libby and Lipe, 1992; Awasti and Pratt, 1990). This prior research suggests that various cognitive phenomena may serve as intervening variables in the relationship between extrinsic rewards and effort exertion. Therefore, future research should examine the interaction of extrinsic and intrinsic rewards and how they affect effort exertion.

This research did not address the moral hazard associated with unobservable behavior in an agency relationship. Accountants in a public accounting firm often perform their tasks under very constrained time budgets. Determining how individual accountants cope with these time budgets is a beneficial research endeavor. One individual may not record all the time actually spent working on a particular task while another individual may sign off on a task prematurely, i.e., without actually performing the task. Future research could use automated protocol-tracing software to investigate how an individual's work ethic or need for achievement affects his or her response to unattainable time budgets.

Future research could also investigate how effort exertion is affected by (1) other intrinsic motivation factors, (2) organizational structures, (3) organizational environments and (4) cultural differences.

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APPENDIXES

APPENDIX A: TABLES

Table 1

Prior Research

Author	Subjects[1]	Findings[2]
Work ethic		
Eisenberger et al. (1982)	96a	HWE subjects more productive than LWE subjects
Greenberg (1977)	84a	HWE subjects more productive than LWE subjects
Merrens and Garrett (1975)	40a	HWE subjects more productive than LWE subjects
Time Pressure		
Sales (1969)	73a	As time pressure increased, productivity increased and quality decreased.
McDaniel (1990)	179c	As time pressure increased, productivity increased and quality decreased.
Need for Achievement		
Lowell (1952)	40a	HNA subjects more productive than LNA subjects
Wendt (1955)	14a 38b	HNA subjects more productive than LNA subjects
Puffer (1989)	98a	HNA subjects completed task later than LNA subjects
Wendt (1955)	14a 38b	Under time pressure: no difference in productivity existed between HNA and LNA subjects; Quality decreased for all subjects but HNA subjects were still more accurate than LNA subjects.
Beh (1989)	40a	Under time pressure: HNA subjects increased productivity at the end of the task but LNA subjects had no change in productivity. Quality decreased for all subjects but HNA subjects were still more accurate than LNA subjects.

[1] a = Undergraduate students, b = High school junior and senior students, c = Staff auditors

[2] HWE high work ethic
LWE low work ethic
HNA high need for achievement
LNA low need for achievement

Table 2

Subjects' Demographic Information

Gender	
Male	368
Female	371
Age	
Mean	21
Standard deviation	4
Semester hours of post secondary education	
Mean	53
Standard deviation	32
Ethnic background	
White	666
Black	38
Asian	28
Hispanic	4
Other	3

Table 3

Homogeneity of Subjects

	No Time Pressure	Imposed Time Pressure	test statistic[1] *p*-value
Mean:			
Work Ethic	84.75	85.99	-1.4195[a] .1562
Need for Achievement	14.48	14.32	.5498[a] .5828
Age	21.03	21.08	-.1550[a] .8768
Post-secondary education hours	54.68	52.84	.7916[a] .4289
Number of subjects:			
male	198	197	.002[b]
female	173	171	.964
white	330	336	2.323[b]
black	22	16	.677
asian	14	14	
hispanic	3	1	
other	2	1	

[1] a = *t*-statistic
b = X^2 value

Table 4

Descriptive Statistics

	Mean	Standard Deviation	Kurtosis	Skewness
Productivity	89.28	20.00	-0.16	0.01
Quality	.92	.08	5.04	-2.62
Ability	49.64	10.85	-0.02	0.03
Work Ethic	85.37	11.98	0.38	-0.07
Need for Achievement	14.40	4.06	-0.15	0.13

Table 5

Correlation Coefficients (Significance Levels)

	Prod	Qual	Abil	WE	NA
Qual	0.1727 (.0001)				
Abil	0.4353 (.0001)	.0166 (.6529)			
WE	0.0722 (.0498)	.1286 (.0005)	.0228 (.5364)		
NA	-0.0226 (.5388)	.0180 (.6246)	.0124 (.7364)	.1070 (.0036)	

Prod = productivity
Qual = quality
Abil = ability
WE = work ethic
NA = need for achievement

Table 6

Overall Models: Work Ethic

	Productivity	Quality
F-ratio	26.33	4.04
p-value	.0001	.0076

Table 7

Productivity ANCOVA: Work Ethic and Time Pressure[1]

Source	df	Mean Square	F-ratio	p-value	ω^2
Main effects:					
Work ethic	1	1283.323	3.95	.0475	.01
Time pressure	1	2339.492	7.20	.0076	.04
Interaction: Work ethic by time pressure	1	936.049	2.88	.0904	.00
Covariate ability	1	25797.711	79.43	.0001	
Model error	384	8550.374			
Total	388				

[1]Type III sums of squares

Table 8

Quality ANOVA: Work Ethic and Time Pressure[1]

Source	df	Mean Square	F-ratio	p-value	ω^2
Main effects:					
Work ethic	1	0.067	8.76	.0033	.02
Time pressure	1	0.008	1.04	.3074	.00
Interaction: Work ethic by time pressure	1	0.019	2.53	.1127	.00
Model error	385	0.008			
Total	388				

[1]Type III sums of squares

Table 9

Overall Models: Need for Achievement

	Productivity	Quality
F-ratio	34.41	.02
p-value	.0001	.9957

Table 10

Productivity ANCOVA: Need for Achievement and Time Pressure[1]

Source	df	Mean Square	F-ratio	p-value	ω^2
Main Effects:					
Need for achievement	1	129.863	0.41	.5220	.00
Time pressure	1	5783.171	18.29	.0001	.06
Interaction: Need for achievement by time pressure	1	3.183	0.01	.9201	.00
Covariate ability	1	30736.496	97.19	.0001	
Model error	461	316.254			
Total	465				

[1]Type III sums of squares

Table 11

Quality ANOVA: Need for Achievement and Time Pressure[1]

Source	df	Mean Square	F-ratio	p-value	ω^2
Main Effects:					
Need for achievement	1	8.86E-05	0.01	.9144	.00
Time pressure	1	1.92E-04	0.03	.8701	.00
Interaction: Need for achievement by time pressure	1	2.15E-04	0.03	.8623	.00
Model error	462	7.16E-03			
Total	465				

[1]Type III sums of squares

Table 12

Summary of Hypotheses and Results

Hypothesis	Accept/Reject	p-value
1. Subjects with a high work ethic will be more productive than subjects with a low work ethic.	Accept	.0475
2. Subjects with a high work ethic will produce higher quality output than subjects with a low work ethic.	Accept	.0033
3. Subjects with a high work ethic will be more productive under imposed time pressure than subjects with a low work ethic (i.e., no interaction exists between work ethic and time pressure).	Accept	.0904[a]
4. Subjects with a high work ethic will produce higher quality output under imposed time pressure than subjects with a low work ethic (i.e., no interaction exists between work ethic and time pressure).	Accept	.1127[a]
5. Subjects with a high need for achievement will be more productive than subjects with a low need for achievement.	Reject	.5220
6. Subjects with a high need for achievement will produce higher quality output than subjects with a low need for achievement.	Reject	.9114
7. Under imposed time pressure, no differences in productivity exist between subjects with a high need for achievement and subjects with a low need for achievement (i.e., an interaction exists between need for achievement and time pressure).	Reject	.9201
8. Under imposed time pressure, subjects with a high need for achievement will produce higher quality output than subjects with a low need for achievement (i.e., no interaction exists between need for achievement and time pressure).	Reject	.8622

[a] Indicates no interaction between work ethic and time pressure.

APPENDIX B: FIGURES

	High WE[a]	Low WE[a]	Total
Time Pressure	108	88	196
No Time Pressure	95	98	193
Total	203	186	389

[a]work ethic

Figure 1

Number of Subjects: Work Ethic x Time Pressure

	High NA[a]	Low NA[a]	Total
Time Pressure	106	126	232
No Time Pressure	114	120	234
Total	220	246	466

[a]need for achievement

Figure 2

Number of Subjects: Need for Achievement x Time Pressure

	High WE[a]	Low WE[a]	Row Mean
Time Pressure	94.19	87.43	90.81
No Time Pressure	86.09	85.56	85.825
Column mean	90.14	86.49	

[a]work ethic

Figure 3

Productivity: Least Squares Means (Work Ethic x Time Pressure)

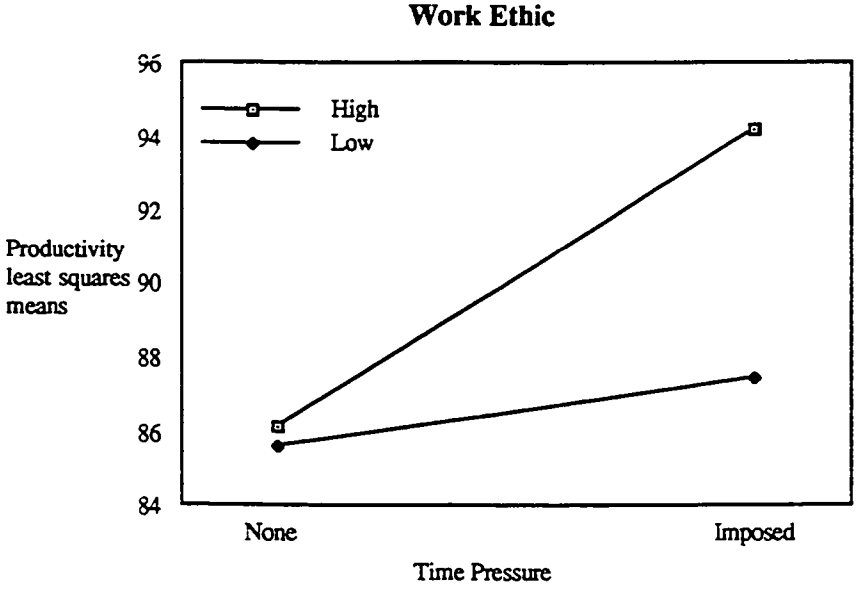

Figure 4

Productivity: Work Ethic x Time Pressure

	High WE[a]	Low WE[a]	Row Mean
Time Pressure	.92	.90	.91
No Time Pressure	.93	.90	.915
Column mean	.925	.90	

[a]work ethic

Figure 5

Quality: Least Squares Means (Work Ethic x Time Pressure)

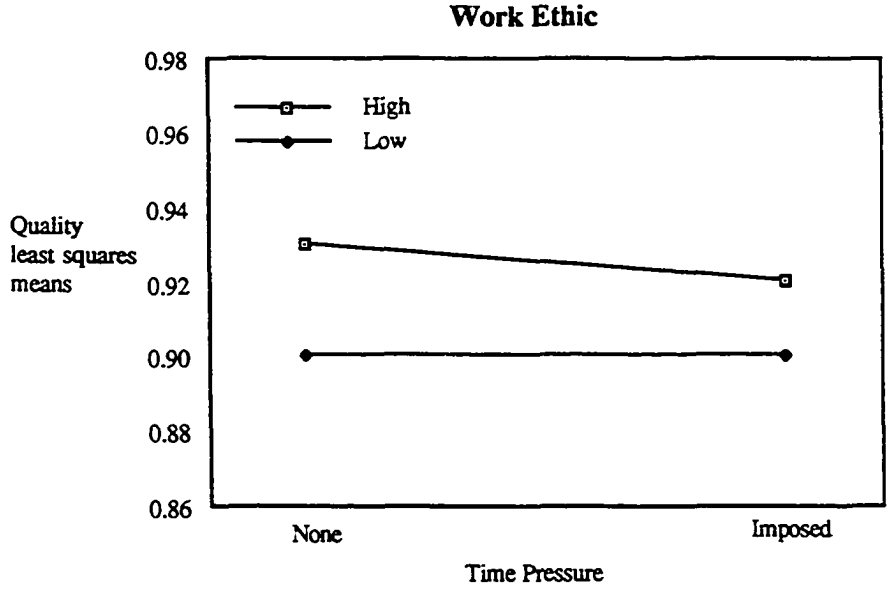

Figure 6

Quality: Work Ethic x Time Pressure

	High NA[a]	Low NA[a]	Row Mean
Time Pressure	91.73	92.62	92.17
No Time Pressure	84.38	85.60	84.99
Column mean	88.06	89.11	

[a]need for achievement

Figure 7

Productivity Least Squares Means: (Need for Achievement x Time Pressure)

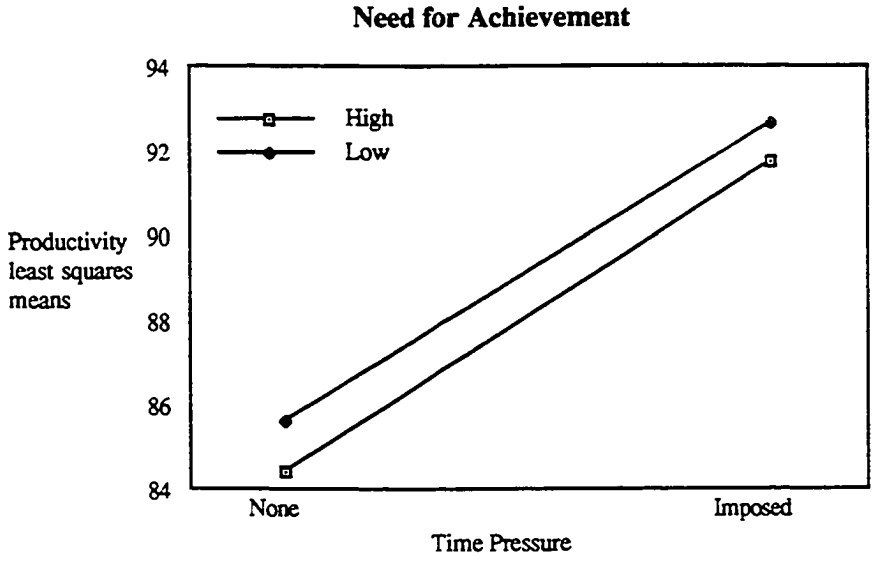

Figure 8

Productivity: Need for Achievement x Time Pressure

	High NA[a]	Low NA[a]	Row Mean
Time Pressure	.92	.92	.92
No Time Pressure	.92	.92	.92
Column mean	.92	.92	

[a]need for achievement

Figure 9

Quality: Least Squares Means (Need for Achievement x Time Pressure)

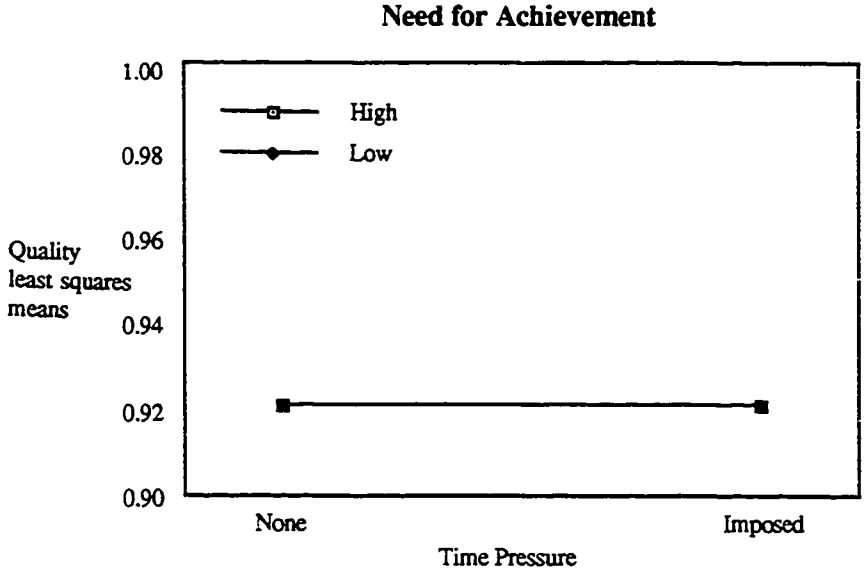

Figure 10

Quality: Need for Achievement x Time Pressure

APPENDIX C: INFORMED CONSENT

This experiment is part of a dissertation project at the University of Tennessee. Any questions regarding this experiment can be directed to Cathy Sullivan at 974-6881. There are no questions or markings to identify you as a respondent. The results will be tabulated and analyzed in aggregate form, so that anonymity is assured. Your completion of this task constitutes your consent to participate in this study. Your participation in this study is greatly appreciated.

APPENDIX D: CHARACTER DECODING TASK

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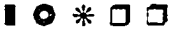
7. 

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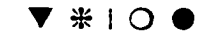
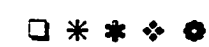
21. 

22. 

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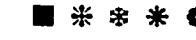
30. 

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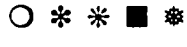
39. 

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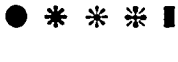
48. 

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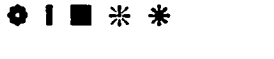
56. 

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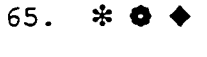
66. 

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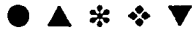
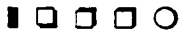
79. 

80. 

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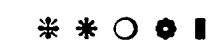
82. 

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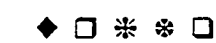
7. 

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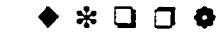
10. 

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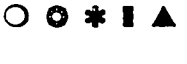
18. 

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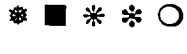
39. 

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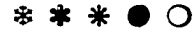
77. 

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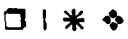
81. 

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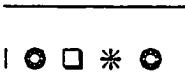
93. 

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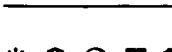
109. 

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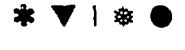
129. 

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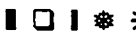
141. 

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	none	very little	moderate	substantial	extreme
How much time pressure did you feel in completing this task?	1	2	3	4	5

Decoding Key

a	❁
b	❂
c	❃
d	❄
e	❅
f	❆
g	❇
h	❈
i	❉
j	❊
k	❋
l	●
m	❍
n	■
o	❏
p	❐
q	❑
r	❒
s	▲
t	▼
u	◆
v	❖
w	◗
x	❘
y	❙
z	❚

APPENDIX E: PREFERENCE PROFILE I

PREFERENCE PROFILES --- PART I

Please answer the following questions from the standpoint of how you feel.

	Strongly disagree	Disagree	Tend to disagree	Tend to agree	Agree	Strongly agree
1. Most people spend too much time in unprofitable amusements.	-3	-2	-1	1	2	3
2. Our society would have fewer problems if people had less leisure time.	-3	-2	-1	1	2	3
3. Money acquired easily (e.g., through gambling or speculation) is usually spent unwisely.	-3	-2	-1	1	2	3
4. There are few satisfactions equal to the realization that one has done their best at a job.	-3	-2	-1	1	2	3
5. The most difficult college courses usually turn out to be the most rewarding.	-3	-2	-1	1	2	3
6. Most people who don't succeed in life are just plain lazy.	-3	-2	-1	1	2	3
7. The self-made person is likely to be more ethical than the person born to wealth.	-3	-2	-1	1	2	3
8. I often feel I would be more successful if I sacrificed.	-3	-2	-1	1	2	3
9. People should have more leisure time to spend in relaxation.	-3	-2	-1	1	2	3
10. Any person who is able and willing to work hard has a good chance of succeeding.	-3	-2	-1	1	2	3
11. People who fail at a job have usually not tried hard enough.	-3	-2	-1	1	2	3
12. Life would have very little meaning if we never had to suffer.	-3	-2	-1	1	2	3
13. Hard work offers little chance of success.	-3	-2	-1	1	2	3
14. The credit card is a ticket to careless spending.	-3	-2	-1	1	2	3
15. Life would be more meaningful if we had more leisure time.	-3	-2	-1	1	2	3
16. The person who can approach an unpleasant task with enthusiasm is the person who gets ahead.	-3	-2	-1	1	2	3
17. If one works hard enough he/she is likely to make a good life for themselves.	-3	-2	-1	1	2	3
18. I feel uneasy when there is little work for me to do.	-3	-2	-1	1	2	3
19. A distaste for hard work usually reflects a weakness of character.	-3	-2	-1	1	2	3

THIS IS THE END OF PART I: PLEASE WAIT FOR FURTHER INSTRUCTIONS

APPENDIX F: PREFERENCE PROFILE II

PREFERENCE PROFILES --- PART II

This part consists of a number of pairs of statements about things that you may or may not like; about ways in which you may or may not feel. Choose the statement in each pair that best describes you. If both statements describe how you feel, then you should choose the one which you think is more characteristic. If neither statement accurately describes how you feel, then you should choose the one which you consider less inaccurate.

Your choice, in each instance, should be in terms of what you like and how you feel at the present time, and not in terms of what you think you should like or how you think you should feel. This is not a test. There are no right or wrong answers. Your choices should be a description of your own personal likes and feelings. Make a choice for every pair of statements; do not skip any.

1. a. I like to help my friends when they are in trouble.
   b. I like to do my very best in whatever I undertake.

2. a. I like to find out what great men and women have thought about various problems in which I am interested.
   b. I would like to accomplish something of great significance.

3. a. Any written work that I do I like to have precise, neat and well organized.
   b. I would like to be a recognized authority in some job, profession or field of specialization.

4. a. I like to tell amusing stories and jokes at parties.
   b. I would like to write a great novel or play.

5. a. I like to be able to come and go as I want to.
   b. I like to be able to say that I have done a difficult job well.

6. a. I like to solve puzzles and problems that other people have difficulty with.
   b. I like to follow instructions and do what is expected of me.

7. a. I like to experience novelty and change in my daily routine.
   b. I like to tell my superiors that they have done a good job on something, when I think they have.

8. a. I would like to be a recognized authority in some job, profession or field of specialization.
   b. I like to have my work organized and planned before beginning it.

9. a. I like to be able to do things better than other people can.
   b. I like to tell amusing stories and jokes at parties.

10. a. I like to accomplish tasks that others recognize as requiring skill and effort.
    b. I like to be able to come and go as I want to.

11.	a.	I like to be successful in things undertaken.
	b.	I like to form new friendships.
12.	a.	I like to solve puzzles and problems that other people have difficulty with.
	b.	I like to judge people by why they do something - not by what they actually do.
13.	a.	I like to accomplish tasks that others recognize as requiring skill and effort.
	b.	I like my friends to encourage me when I meet with failure.
14.	a.	When planning something, I like to get suggestions from other people whose opinions I respect.
	b.	I like my friends to treat me kindly.
15.	a.	I would like to write a great novel or play.
	b.	When serving on a committee, I like to be appointed or elected chairperson.
16.	a.	I would like to be a recognized authority in some job, profession or field of specialization.
	b.	I feel guilty whenever I have done something I know is wrong.
17.	a.	I like to do my very best in whatever I undertake.
	b.	I like to help other people who are less fortunate than I am.
18.	a.	I like to do things better than other people can.
	b.	I like to eat in new and strange restaurants.
19.	a.	I like to be able to say that I have done a difficult job well.
	b.	I like to work hard at any job I undertake.
20.	a.	I like to tell my superiors that they have done a good job on something, when I think they have.
	b.	I like to complete a single job or task at a time before taking on others.
21.	a.	I would like to accomplish something of great significance.
	b.	I like to kiss attractive persons of the opposite sex.
22.	a.	I would like to write a great novel or play.
	b.	I like to attack points of view that are contrary to mine.
23.	a.	I like to be loyal to my friends.
	b.	I like to do my very best at things I undertake.

24.	a.	I like to observe how another individual feels in a given situation.
	b.	I like to be able to say I have done a difficult job well.
25.	a.	I like my friends to encourage me when I meet with failure.
	b.	I like to be successful in things undertaken.
26.	a.	I like to be one of the leaders in the organizations and groups to which I belong.
	b.	I like to be able to do things better than other people.
27.	a.	When things go wrong for me, I feel that I am more to blame than anyone else.
	b.	I like to solve puzzles and problems that other people have difficulty with.
28.	a.	I like to do things for my friends.
	b.	When planning something, I like to get suggestions from other people whose opinions I respect.
29.	a.	I like to help my friends whenever they are in trouble.
	b.	I like to do my very best in whatever I undertake.
30.	a.	I like to travel and see the country.
	b.	I like to accomplish tasks that others recognize as requiring skill and effort.
31.	a.	I like to work hard at any job I undertake.
	b.	I would like to accomplish something of great significance.
32.	a.	I like to go out with attractive people of the opposite sex.
	b.	I like to be successful in things undertaken.
33.	a.	I like to read newspaper accounts of murders and other forms of violence.
	b.	I would like to write a great novel or play.
34.	a.	I like to work hard at any job I undertake.
	b.	I like to experience novelty and change in my daily routine.
35.	a.	If I have to take a trip, I like to have things planned in advance.
	b.	I like to work at a puzzle or problem until it is solved.

THIS IS THE END OF PART II: PLEASE WAIT FOR FURTHER INSTRUCTIONS

APPENDIX G: DEMOGRAPHIC INFORMATION

DEMOGRAPHIC INFORMATION

Gender: Male Female

Race or Ethnic Group: White Black Hispanic Asian Other _____

Major or intended major _____

Hours of course work completed _____

Age _____ years

APPENDIX H: ABILITY INSTRUMENT

CLERICAL SPEED AND ACCURACY

MARK YOUR ANSWERS ON THE SEPARATE ANSWER SHEET

DIRECTIONS

Find the space on the Answer Sheet for **Part I** of Clerical Speed and Accuracy.

This is a test to see how quickly and accurately you can compare letter and number combinations. On the following pages are groups of these combinations; each test item contains five. These same combinations appear after the number for each test item on the Answer Sheet, but they are in a different order. You will notice that in each test item one of the five is **underlined.** You are to look at the **one** combination that is underlined, find the **same** one after that item number on the Answer Sheet, and fill in the circle under it.

The following examples have been marked correctly on your Answer Sheet. Note that the combination marked on the Answer Sheet must be exactly the same as the one that is underlined in the test item.

Examples

V. <u>AB</u> AC AD AE AF

W. aA aB BA Ba <u>Bb</u>

X. A7 7A B7 <u>7B</u> AB

Y. Aa Ba <u>bA</u> BA bB

Z. 3A 3B <u>33</u> B3 BB

If you finish the items in Part I before time is called, check your work. Do not turn to Part II until you are told to do so. Work as fast as you can.

You will have 3 minutes for each part of this test. Work as rapidly and as accurately as you can. If you are not sure of an answer, mark the choice that is your best guess.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

PART I

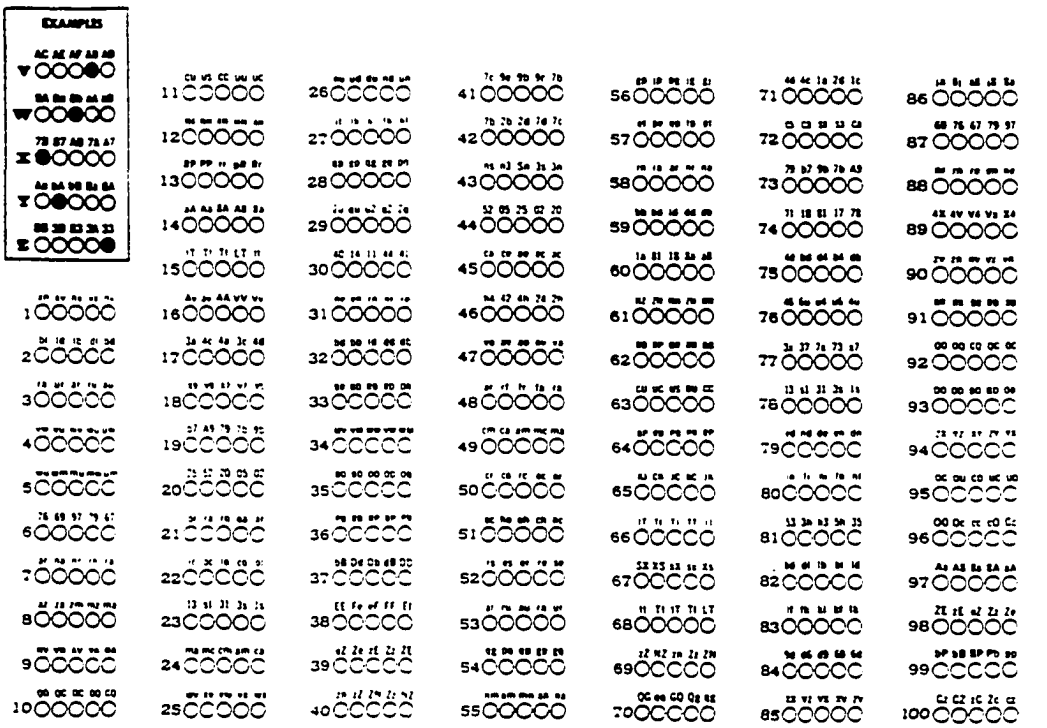
1. **nv** nx xn vx xv	21. ar ra **ro** or oa	41. 7c 9b **9c** 9e 7b	61. HN HZ ZH ZN **NH**	81. 35 53 h3 **3h** 5h
2. bl dl ld **lb** bd	22. lc lo ol **oc** co	42. 7c **2b** 7b 2d 7d	62. RR BR RB **88** RP	82. bl **dl** ld lb bd
3. ar au ur ra **ru**	23. 1s 13 31 3s **s1**	43. **n3** Sn 3s ns 3n	63. CU **UU** UC US CC	83. fk **lk** kf lf kl
4. **wu** vu vw wv uw	24. ma cm ca **mc** am	44. 20 **25** 02 05 52	64. PR PB RB **RP** BP	84. 69 6d 9d d6 **d9**
5. wm um mu wu **mw**	25. xv vx **vw** wx wv	45. ec ac **ca** ce ae	65. CK KJ JC KC **JK**	85. XX VX **VZ** ZV XV
6. **79** 76 67 69 97	26. **ud** un nd nu du	46. 2h h4 42 **4h** 24	66. TI IT **11** Tt TT	86. **j8** a8 8a 8j ja
7. ra **na** nr rn ar	27. fk **lk** kf lf kl	47. **av** va vo ao ov	67. SX sX sx **Xs** XS	87. 79 76 **67** 69 97
8. za mz **zm** az ma	28. pq **qg** gp gq qp	48. fa **fr** ra rf ar	68. LT Tt **tT** Tl tt	88. nr **ne** en rn re
9. AV VN NV **NA** VA	29. 2u 2q **qu** q2 u2	49. **ma** cm ca mc am	69. Zz NZ zZ zn **ZN**	89. 4X 4V **Vx** V4 X4
10. OQ **CQ** QC QO OC	30. 41 44 **14** 11 40	50. rc cr **co** oc or	70. GQ Qg **qq** qg QG	90. vn vz zv nv **zn**
11. **CU** UU UC US CC	31. nr ne en rn **re**	51. **ch** ho hc oc oh	71. 4c **1a** lc 4d 2d	91. B8 R8 **8B** RB 8R
12. 4H 4N NH N4 **HN**	32. bb **dd** ld db bd	52. se **rs** re es er	72. **S8** C3 S3 C8 CS	92. **OQ** CQ QC QO OC
13. Rr RP **pR** PP rr	33. RB **RD** DR BR 30	53. **ar** au ur ra ru	73. A9 **7b** 79 9b b7	93. OD OB **BD** DO BO
14. Aa A8 8a **8A** aA	34. MW MV VW **VM** WM	54. pq qg **zp** gq qp	74. 18 81 **71** 78 17	94. ZY ZX XY **YZ** YX
15. LT Tt **tT** Tl tt	35. OD OB BO **DO** 30	55. am na nm **mn** an	75. b4 4d db d4 **bd**	95. OU OC **UC** UO CO
16. Av **Vv** av VV AA	36. PR **PB** RB RP 3P	56. zj **jz** pz jp zp	76. **u6** u4 4u 6u 46	96. Cc Oc OO cO **cc**
17. 4d 3c **4a** 4c 3a	37. Od Ob **dB** bB OD	57. **tp** et ep pe pt	77. 3x 7x **73** 37 x7	97. Aa **A8** 8a 8A aA
18. X7 V9 VS X9 **V7**	38. EE Ef eF Fe **FF**	58. ra na nr rn **ar**	78. 1s 13 31 3s **s1**	98. Ze Zz **ZE** zE eZ
19. **A9** 7b 79 9b b7	39. Ze Zz **ZE** zE eZ	59. bb dd ld **db** bd	79. **en** dn de ed nd	99. BP Pb bP **pp** bB
20. **20** 25 02 05 52	40. **Zz** NZ zZ zn ZN	60. 18 **81** 1a 8a a8	80. rn fi **fn** in nf	100. **Cz** CZ Zc zC cz

STOP. YOU MAY CHECK YOUR WORK ON THIS PART. DO NOT TURN TO PART II.

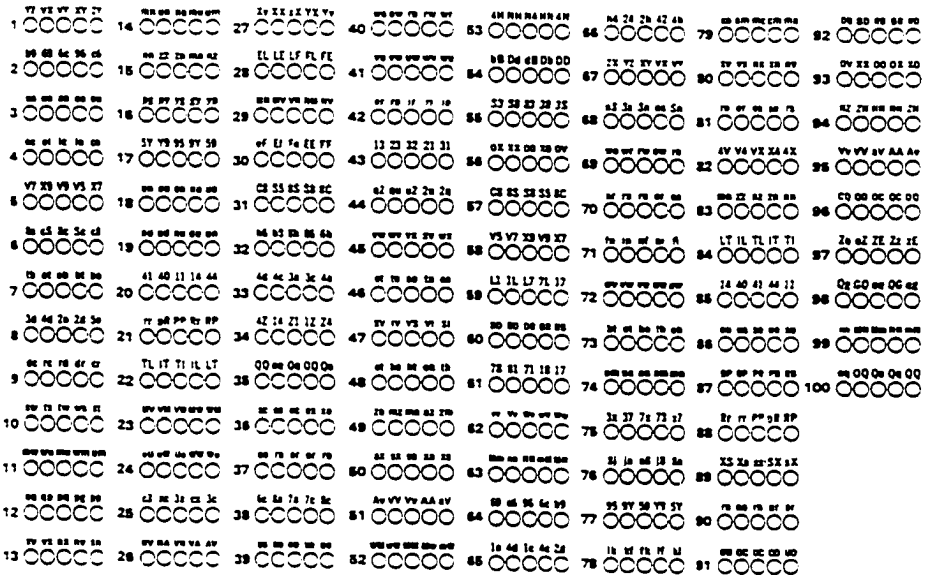
PART II

1. YZ VY VX XY ZY
2. b9 c6 69 96 6c
3. ou oa ua uo ao
4. lc lo ol oc co
5. X7 V9 VS X9 V7
6. Sc 8c 8s cS c8
7. oo bt ot tb bo
8. 5e 3d 4d 2e 2d
9. rc dc dr rd cr
10. ws sw st tw ts
11. wm um mu wu mw
12. pp qq pq pg qp
13. nv nz zn vz zv
14. mu un um mn mu
15. zn zz nz nn mn
16. pg gy py yp yg
17. 59 9Y 5Y Y9 95
18. nu on ou un uo
19. ud un nd nu du
20. 41 44 14 11 40
21. Rr RP pR PP rr
22. LT IT IL TL TI
23. MW MV VW VM WM
24. Uu Wu uW WW uU
25. 3x xc c3 cx 3c
26. AV VN NV NA VA
27. YX XX Yy Xy xX
28. EL FL FE LF LE
29. MN NM VN MV NV
30. EE Ef eF Fe FF
31. S8 C8 8C 8S SS
32. h6 h8 86 8h 6h
33. 4d 3c 4a 4c 2a
34. Z4 Z1 14 1Z 4Z
35. Qo Qq OQ oq QQ
36. xc ex ec ce xe
37. ar ra ro or oa
38. 8c 3a 7a 6c 7c
39. us ue se su eu
40. wo ro rw ow wr
41. wu vz zx wv uw
42. er n ir ie re
43. 31 23 32 13 21
44. 2u 2q qu q2 u2
45. zv vz vw wx wv
46. ae et ea ta te
47. VI SI SV VS IV
48. th he et en ht
49. za mz zm az ma
50. sz sa ax xs xa
51. Av Vv aV VV AA
52. Mw wW WM MM mW
53. 4H 4N NH N4 HN
54. Dd Db dB bB DD
55. S8 83 S3 38 3S
56. XO OO OX OV XX
57. S8 C8 8C 8S SS
58. X7 V9 VS X9 V7
59. L7 L1 17 1L 7L
60. RB RD DR BR BD
61. 18 81 71 78 17
62. Vv Ww Wv wV vv
63. Mm MN NN nn mM
64. b9 c6 69 96 6c
65. 4c 1a 1c 4d 2d
66. 2h h4 42 4h 24
67. YZ VY VX XY ZX
68. n3 Sn 3s ns 3n
69. wo ro rw ow wr
70. ar ra ro or oa
71. ni fi fn in nf
72. wu vu vw wv uw
73. th he et en ht
74. am na nm mn an
75. 3x 7x 73 37 x7
76. j8 x8 8a 8j ja
77. 59 9Y 5Y Y9 95
78. lk ik kf lf kl
79. ma cm ca mc am
80. nv nx xn vx xv
81. se rs re es er
82. 4X 4V VX V4 X4
83. zn zz nz nn mn
84. LT IT IL TL TI
85. 41 44 14 11 40
86. us ue se su eu
87. PR PB RB RP BP
88. Rr RP pR PP rr
89. SX sX sx Xs XS
90. rs ns nr rn ar
91. OU OC UC UO CO
92. RB RD DR BR BD
93. XX XO OO OX OV
94. HN HZ ZH ZN NH
95. Av Vv aV VV AA
96. OQ CQ QC QO OC
97. Ze Zz ZE zE eZ
98. GQ Qg qq qg QG
99. Mm MN NN nn mM
100. Qo Qq OQ oq QQ

STOP. YOU MAY CHECK YOUR WORK ON THIS TEST. DO NOT TURN TO ANY OTHER TEST



— PART II



VITA

M. Cathy Sullivan was born on March 11, 1951 in Sioux City, Iowa. She graduated from Harlan Community High School in Harlan, Iowa in May, 1969. She received a Bachelor of Arts degree in Accounting from Carroll College in Helena, Montana in May, 1983.

In August, 1983 Cathy began her professional career in the Helena, Montana office of Anderson ZurMuehlen and Co. P.C. She received her CPA certificate in 1984 and worked for Anderson ZurMuehlen and Co. P.C. until she began her academic career.

In January, 1991 Cathy entered the University of Tennessee in Knoxville. She worked simultaneously on her Masters of Accountancy and Doctor of Philosophy degrees. While at the University of Tennessee, Cathy worked as a graduate teaching assistant and a research assistant. She was a Fellow at the American Accounting Association Doctoral Consortium in 1992. She received her Masters of Accountancy degree in December 1993 and graduated in May, 1994 with a Doctor of Philosophy degree with a major in business administration.