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An Experimental Investigation of Some Hypothesized Behaviors of College Student Procrastinators

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AN EXPERIMENTAL INVESTIGATION OF SOME HYPOTHESIZED BEHAVIORS OF
COLLEGE STUDENT PROCRASTINATORS

by

William George McCown

A Thesis Submitted to the Faculty of the Graduate
School of Loyola University of Chicago in Partial
Fulfillment of the Requirements for the Degree of
Master of Arts

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1986

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Finally, the author would like to thank his beautiful wife Judy, without whom this project would not have been completed.

DEDICATION

This thesis is dedicated to Frederick Brugge (1924-1985), scholar, bon vivant, eccentric, and past and future inspiration.

The true human tragedy is a great man not allowed to think his thoughts to their natural, forceful, usually brilliant conclusion.

Ludwig Wittgenstein

VITA

William George McCown was born on March 8, 1956, in Florence, South Carolina. He grew up in Washington D.C. and graduated from Fort Hunt High School in Alexandria, Virginia, in June of 1974.

He attended Kenyon College, in Gambier Ohio from September, 1974 to May, 1976, and September, 1977, to May, 1978. He also attended the University of Aberdeen, Scotland, from July of 1976 to July of 1977, where he read for senior Honours in the Department of Psychology and the Department of Sociology.

Mr. McCown graduated magna cum laude May, 1978, with a double major of psychology and sociology. Additionally, he graduated with highest honors and distinction from the Department of Psychology. He was elected into Phi Beta Kappa May, 1978. He also received the annual departmental award in psychology and the George Herbert Meade Award for outstanding research from the department of Anthropology and Sociology.

Mr. McCown was employed at Alexandria Hospital, Alexandria, Virginia, as a psychiatric technician and research assistant. from October, 1978 until August, 1984. He worked as a residential therapist at Mt. Vernon Center for Community Mental Health from April, 1981 to March, 1983. From March, 1983 to August, 1984 he worked as a family therapist and crisis intervention specialist for Prince William County Community

Mental Health Center, where he received extensive training in family therapy. Additionally, he worked as a research assistant for the Institute for the Study of Religion and Mental Health, in Alexandria, Virginia. He also worked as a substance abuse consultant and therapist for Christ Chapel Community Mental Health Center, Woodbridge, Virginia.

Mr. McCown came to Loyola University in August, 1984, where he received a University Fellowship. He obtained practicum training at North Chicago VA Hospital from June to August, 1985. He presently is employed at Maine Center for Mental Health as a crisis intervention specialist.

Mr. McCown is married to Judith Johnson, with whom he has coauthored several professional papers. These include the "Inability of Delinquents to Decode Facial Affects", presented at the first International Conference on the Meaning of the Face, in Cardiff, Wales in June, 1985. These also include MMPI Profiles and Proprietary Security Guards, and a Factor Analytic Study of the Decisionmaking Process in Probationary Recommendation for Outpatient Psychotherapy, both presented at the American Academy of Criminal Justice Science, 1985. He has also contributed to a text on the Old Testament, and has written articles on horse racing and on popular culture. His hobbies also include skydiving, winemaking, and home computing.

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CHAPTER I

INTRODUCTION

Sloth, according to Saint Augustine is one of the seven deadly sins, equal in wickedness to greed, envy, hate and lust (Bartlett, 1952). If there is truth in Augustine's pronouncement, then social scientists are guilty of a certain moral neglect. Procrastination, the contemporary equivalent to Augustine's sloth, is one of the least studied aspects of common human behavior.

Contemporary definitions of procrastination tend to minimize the pejorative connotations associated with the term only slightly. Webster's New Collegiate Dictionary (1984) defines the verb procrastinate as "to put off intentionally and reprehensibly the doing of something that should be done" (p. 918). By definition, procrastination denotes undesirable behavior.

Silver (1974), a philosopher, has criticized traditional definitions of procrastination for failing to stress the irrationality of the act. He believes that the sine qua non of procrastination is that an individual forfeits the likelihood that a task will be completed successfully and optimally. Procrastination, he argues, is not avoidance. Individuals who procrastinate do not intend to ignore or avoid the task they are delaying. Instead, they simply put the task off, past the time

it should be begun to guarantee the maximal likelihood of its successful completion. Procrastination, Silver believes, is paradoxical. The procrastinating individual deliberately chooses to act in a way that is not in his or her best interest. Silver includes this paradox in his definition of procrastination. For him, procrastination is defined as a rational choice, with known consequences, that reduces the likelihood of optimally obtaining the sought-after goal. It does this by delaying the most appropriate time to begin goal-oriented behavior.

Silver and Sabini (1981) note that by this definition, any procrastination is bad. Unlike the mere avoidance of a task, procrastination is self-defeating and goal undermining. Avoidance of a task can be either rational or irrational. This is dependent upon the probability that the task will actually have to be completed within a specific time constraint. Avoiding a task that might not eventually have to be completed is seen by Silver and Sabini as analogous to a wager. The individual engaged in task avoidance is placing his faith that the task at hand will never be required, betting, as it were, on the longshot possibility that circumstances will change. But once deadlines become firm, the outcome of the race is already known. At that point, task avoidance becomes procrastination. Procrastination can only occur when deadlines are known and task completion is required. An individual who procrastinates is freely choosing to act against his or her own self interests. He or she is betting on a loser in a race that is already over. Clearly, Silver and Sabini argue (1981), there can be no incidences of "good" or constructive procrastination with this definition.

Ellis and Knaus (1977) also believe that procrastination is inherently undesirable. They liken it, in fact, to "the so-called neurotic conditions". Like any self-defeating behavior, no one, they argue, could find procrastination a defensible personality pattern. Ellis and Knaus find it curious, therefore, that few psychologists have attempted to understand why people procrastinate.

Indeed, to this day this neglect of procrastination as a item of interest to social scientists remains the case. Procrastination is not a topic heading in current or past years of Psychological Abstracts. To date, there has not been one monograph or scholarly book published on the topic. Unlike other common problems of living, such as depression and stress, procrastination is not discussed in introductory psychological texts. Only a handful of dissertations, all written during the last ten years, have attempted to empirically investigate the phenomenon from a psychological perspective.

The lack of attention by psychologists to this problem is perplexing. Judging by interest found in the popular press, procrastination is a serious concern of many people (i.e., Lakein, 1973). Yet only a very few psychologists and other students of human behavior have followed trends in the popular press, attempting to apply their expertise to explaining why people put off completing required tasks on time (Burka & Yuen, 1983; Ellis & Knaus, 1977; Horn, 1979; Knaus, 1979).

Most of these psychologists that have discussed procrastination write from a decidedly "self-help" perspective, aiming to assist the

procrastinator in changing his or her "self-defeating mindset" (Horn, 1979). Despite the laudatory purpose of these efforts, few have attempted an empirical investigation into the etiology of procrastination. The scant attempts at serious psychological research on procrastination have mostly been made by behaviorist educational psychologists, in their attempts to apply Skinner's (1954) notion of personalized module-based teaching packages.

Specifically, the majority of procrastination research has come from psychologists attempting to develop "personalized systems of instruction" (Nelson & Scott, 1972). A personalized instruction system, or PSI, is defined as a small, unit-based module of academic material, administered to the student at his or her own pace. Module packages are accompanied by frequent feedback, and positive reinforcement, rather than punishment or negative reinforcement. The concept of PSI is a direct application of Skinnerian principles of reinforcement to the classroom (Semb & Glick, 1979).

Procrastination and PSI Curriculum

Brooke and Ruthen (1984) have noted a gradual abandonment of the hope that programmed systems of instruction can be viable classroom alternatives to ordinary instruction. An inherent barrier to their more frequent utilization is the tendency of some students to procrastinate completion of PSI modules. In a PSI course, students are responsible for completing a certain number of such modules, proceeding at their own pace. The advantage of PSI is that it allows students of varying abili-

ties to obtain total mastery of course material by spending as much, or as little time necessary for any one portion of the course.

Naturally, the feasibility of such a program is dependent upon cooperation and adequate study habits of students. Rigid deadlines requiring module completion by a particular time destroys the system's flexibility for students having problems with particular areas, and for slow learners in general (Semb & Glick, 1979). On the other hand, the absence of deadlines encourages at least some students to put off module assignments until the very last minute possible. Such a strategy causes undue stress and a decrease in mastery and retention of academic material, outweighing the advantages that PSI may have for other students. Consequently, the successful prediction of which students will procrastinate in a PSI class and to what extent this procrastination will impact upon learning has been of great concern to advocates of PSI.

Nelson and Scott (1972) were the first researchers to examine the impact that procrastination has on PSI curriculum. They found that approximately half of the students in one such course fell two or more units behind during the semester. Lu (1976), an educational psychologist also interested in personalized systems of instruction, found that 90% students fell behind course guidelines at sometime during a typical semester when professors utilized a PSI format.

Semb and Glick (1979), in a brief literature review of personalized systems of instruction with psychology curriculum, found that as many as 44% of students typically "beat it to the wire" in such courses,

50 ✓ 90 6
/ PSI

performing over half of their coursework during the last week of the course. A full 20% of students in personalized instruction courses were found to have sustained incompletes, or to have made other arrangements to carry the class's workload into the next semester or quarter. Additionally, the attrition rate for PSI courses was almost twice as high as for traditional lecture-based curriculum.

Brooke and Ruthen (1984) are rather gloomy about the prospect of PSI being used constructively, despite its potentially numerous advantages. This system seems to offer a superior way to allow students of differing abilities to master the same material to a similar criterion. Yet procrastination in such a system circumvents its advantages, leading to frequent course withdrawal. The authors suggest more research is necessary to establish personality correlates of students who do procrastinate in such a system, hopefully to generate early intervention strategies to arrest the behavior.

However, attempts to discover personality or demographic variables predictive of procrastination in personalized systems of instruction have not been particularly successful. Newman, Ball, Young, Smith, and Purtle (1974) failed to delineate any personality or attitudinal differences in procrastinating students. However, they did find a consistent "core group" of 20-30% of otherwise unremarkable students who tend to procrastinate regardless of the type of curriculum. Morris, Surber, and Bijou (1978) found that students who tend to procrastinate in a personalized system of instruction course tend to be better students than non-

procrastinators, apparently because brighter students somehow feel more comfortable putting work off until the last minute. These two studies, however, do little to differentiate procrastinators from other students.

Procrastination in Traditional Curriculum

So far there have been only four attempts to estimate the number of students procrastinating in regular, as opposed to personalized curriculum classrooms. Hill, Hill, Chabot, and Barrall (1976) conducted the first study attempting to determine rates of procrastination among college students. Five hundred students at five different campuses were asked to rate their own procrastination of academic tasks on a five point Likert-type scale. The authors failed to find differences in self-rated procrastination between students at different campuses, which ranged from a community college to an Ivy League school. They also failed to find differences among college majors.

Regardless of the campus or the students' majors, approximately 10% of students listed themselves as "usual" procrastinators. Another 17% of those surveyed labelled themselves as "frequent" procrastinators, while another 23% stated that they procrastinated "about half of the time". In other words, approximately 50% of the students sampled listed themselves as procrastinating about half of the time or more on academic tasks.

Furthermore, the authors found a significant trend towards increased procrastination throughout the undergraduate careers of students. More than 66% of all freshmen reported themselves as seldom or

rarely procrastinating, while only 43% of all seniors did so. This represents an increase of approximately 50% in procrastinators over the course of three years, a trend the authors regard with dismay.

Briordy (1980) constructed a questionnaire to measure academic procrastination in college students. His measure was a simple self-report, constructed without an attempt to validate it against external criteria. He found that 20% of students reported themselves as "problem procrastinators", indicating that their tendency to put things off interfered with both their grades and their enjoyment of life.

Aitken (1982) constructed a more extensive questionnaire designed to measure college student procrastination. She validated the questionnaire against specific behavioral indices hypothesized to occur more often in chronic procrastinators. These included delays in beginning to study for an exam, numbers of incomplete grades during a school year, and frequency of incurring overdue books at the library. Her study included approximately 120 undergraduate subjects at two state universities.

Aitken (1982) found that the scores on her procrastination inventory were approximately normally distributed. Students one standard deviation above the mean or higher on her scale reported experiencing significant discomfort associated with their persistent tendency to put school assignments off until the last minute. Those in the highest quartile reported the most difficulty in getting assignments done on time and in budgeting hours for studying and exams. Aitken concludes that her

study finds that procrastination is probably a serious problem for up to 25% of college students, a number she feels concurs with the small, but relatively consistent literature available on the topic. Aitken believes that procrastinators impair their overall academic performance and increase their overall stress levels by their consistent delaying of school related tasks.

The most recent study concerning the frequency of procrastination was by Solomon and Rothblum (1984). The frequency of academic procrastination was investigated among 342 college students. One half of the students admitted that procrastination was a moderate or more severe problem. Approximately one quarter of students believed that their tendency to procrastinate significantly interfered with their grade-point average and quality of life. Students who procrastinated believed that their continued inability to meet deadlines resulted in increased stress. Furthermore, students' self-ratings of whether they were consistent procrastinators was significantly associated with when they took quizzes in a PSI psychology course.

In summary, the four studies that do exist seem to indicate that procrastination is a persistent problem for a subgroup of students. In either PSI courses, or traditional curriculum, approximately one quarter of students report serious problems with procrastination interfering with their academic work.

The Psychological Effects of Procrastination

To date, the literature has not detailed the psychological effects of procrastination upon the procrastinator. Ellis and Knaus (1977) state that their clinical experience has shown them that procrastination causes procrastinators to feel increasingly anxious about life. Furthermore, the persistent failure of procrastinators to meet deadlines causes a lowering of self-esteem. This lowering of self-esteem and anxiety, in turn, increases procrastination.

Aitken (1982) found that procrastination, as measured by an inventory she constructed, correlated positively with anxiety, as measured by the Taylor Manifest-Anxiety Scale (Taylor, 1953). Solomon and Rothblum (1984) found that procrastination was associated positively with measures of depression and low self-esteem. Unfortunately, the direction of causality in these studies is unclear.

In summary, although procrastination is recognized as being undesirable, few studies have attempted to delineate its harmful effects upon the persistent procrastinator. This area remains another area of procrastination research neglected by psychologists.

Theories of Procrastination

Despite the dearth of literature on the etiology or seriousness of the behavior of procrastinators, a few explanations have been advanced from psychoanalytic, behavioral, cognitive-behavioral, and personality-oriented psychological perspectives. All of these explanations are potential sources of hypotheses regarding the behavior of procrastinators.

Psychodynamic Theories

As in many areas of psychology, psychodynamically oriented theoreticians have framed some of the earliest explanations of why procrastinators fail to complete tasks on time. Blatt and Quinlan (1967) offer the most psychoanalytically oriented theoretical explanation of the behavior of procrastination. Using the behavioral measure of when students chose to fulfill specific course requirements in an undergraduate class, Blatt and Quinlan separated a group of high and low procrastinators. The two groups were then compared on a number of variables. No significant differences were found between groups on any of the following variables: college grade-point average, vocabulary and information subtest scaled scores of the Wechsler Adult Intelligence Test, areas of academic major, numbers of extracurricular activities, or total scores from the Scholastic Aptitude Test.

However, significant differences were found between groups in measures relating to the perception of time. The procrastinating students had a lower score on the picture arrangement subtest of the WAIS, suggesting to Blatt and Quinlan that they had a diminished ability to anticipate future events. Furthermore, when presented with TAT-like story stems, the procrastinating students told significantly more "present oriented" narratives than the punctual students. The nonprocrastinating students, on the other hand, typically told stories that extended "farther into the the future".

Blatt and Quinlan also claim that the story stems of procrastinators produced more themes concerning death. They interpret all of these results from a psychoanalytic perspective that argues that chronic lateness is related to a subconscious fear of death. Procrastination, they believe, is an unconscious attempt to stave off mortality by showing a contempt for constraints of the clock.

Missildine (1964) offers a less classically analytic, though still psychodynamic, view of the cause of procrastination. He believes that "slow, daydreaming paralysis", the final manifestation of the "procrastination syndrome" is caused by the childrearing practices of parents. He claims that the procrastinating adult was plagued as a child by parents who "overcoerced" achievement, setting unrealistic goals for their child, linking the attainment of these goals to parental love and approval. Such a child raised in this environment, Missildine argues, becomes anxious, feeling worthless when he or she fails to achieve. Later in life, when the child is confronted with a task that risks an evaluation of his or her personal worth or abilities, he/she tends to re-enact those early feelings, dawdling and stalling rather than attempting to meet the demands imposed on her or him. The results are specific incidences of procrastination that baffle the previously well functioning adult.

MacIntyre (1964) also concurs that faulty childrearing can result in procrastinating behavior in adults. She believes that either of two parental extremes can cause this problem. The parent who is too permis-

sive with her/his child is likely to produce a "nervous underachiever", who simply becomes too anxious to meet future self-imposed deadlines. The parent who is too stern is liable to produce an angry underachiever, who touts his/her independence from parental figures by habitual disregard for the authority of the clock.

Spock (1971) also cites the role of parents in the development of the procrastinating child. He believes that unconscious feelings of parental anger express themselves when children fail at parental-imposed tasks. Children unconsciously respond to this anger by demonstrating a delay of future goal-oriented behavior. When the adult raised under these conditions encounters a task requiring a significant degree of achievement, he or she unconsciously remembers the parental conflict. The adult, according to Spock, frequently responds to this unconscious memory and subsequent resentment by attempting to thwart the wishes of the "parental figure" who is imposing the achievement-oriented task. The result is that the adult finds him or herself chronically unable to finish any task that is reminiscent of the early childhood conflicts between him or herself and her parents. The adult becomes a chronic procrastinator, with no insight into his or her behavior. At this stage, the procrastinator would require insight-oriented psychotherapy to be free of his or her behavioral problems.

Behavioral Theories of Procrastination

Perhaps typical of the philosophy of behaviorism, behavioral discussions of procrastination have focused more on treatment than etiology. One exception is Ainslie's theory of specious reward (Ainslie, 1975). Ainslie suggests that there is a strong human tendency to choose the short-term reward over the long-term good, providing the short term goal is immediately pleasurable. For the procrastinator, this tendency has developed into a habit. As a result, an unfortunate feedback loop has developed. Self-esteem enhancing behavior (i.e. the completion of a goal) is short circuited by the demands for leisure, increasing anxiety associated with the task at hand. Such anxiety additionally tends to increase the likelihood of the choice of the immediate pleasure (or absence of pain) over the longer term and more appropriate goal of task completion.

Presently, one study can be found that at least partially supports Ainslie's (1975) theory as it applies to procrastinators. Solomon and Rosenblum (1984) studied procrastination in 342 college students. They factor analyzed the reasons given by students for individual incidences of procrastination. A general factor of "task unpleasantness" emerged from the factor matrix, accounting for approximately a quarter of the variance. Solomon and Rosenblum's conclusion is that students procrastinate tasks that they find unpleasant.

Several behavioral treatment strategies have been constructed for general academic difficulties. Many include a component addressing the

ego-defensive function

problem of procrastinating of school assignments (e.g., Greiner & Karoly, 1976;) Regrettably, the literature is devoid of any outcome studies utilizing similar methods to treat procrastinating behavior apart from the more generalized academic deficits usually treated under this rubric.

Cognitive-Behavioral Theories of Procrastination

Cognitive-behavioral theories of procrastination have, so far, had little impact on understanding of this behavior. Ellis and Knaus (1977) state that clinical experience has related procrastination to irrational fears and self-criticisms. The procrastinator, they argue, is frequently unsure of his/her ability to complete a task. Consequently, he or she delays starting the task in question.

Ellis and Knaus (1977) believe that at the heart of such irrational fear is an inappropriate concept held by the procrastinator of what constitutes an adequately accomplished task. Since procrastinators are so perfectionistic, failure is inevitable. To circumvent the emotional consequences of this failure, procrastinators delay beginning the task until it cannot be completed satisfactorily. The "payoff" for the procrastinator, Ellis and Knaus argue, is that his/her avoidant behavior furnishes a convenient excuse for the inevitable failure caused by this avoidance. A task done poorly by the procrastinator can be blamed on time limitations or even laziness, rather than inability. In this manner, procrastination serves an ego-defensive function. Furthermore, its occurrence is perpetuated despite the anxiety it seems to create in the frantic last minute efforts of the procrastinator.

Empirical evidence for Ellis and Knaus' (1977) theory that procrastinators possess irrational perfectionistic beliefs is lacking. Aitken (1982) found that procrastinators were actually less perfectionistic than nonprocrastinators, as measured by direct self-report and several personality inventories. She regards this as evidence that Ellis and Knaus' cognitive theory is inadequate in describing the cognitive behaviors associated with this syndrome.

On the other hand, more recent evidence seems to offer at least partial support for Ellis and Knaus theory that procrastination is related to the cognitions that successful task completion is impossible. Solomon and Rothblum (1984) studied the frequency of procrastination in 342 college students. As mentioned above, they factor analyzed the results of a questionnaire designed to detect the reasons for college student procrastination. They found a general factor, again accounting for a quarter of the total variance, relating to fear of task failure. Simply put, students avoided doing assignments that they thought they could not do adequately. This can be seen as partial support for Ellis and Knaus' (1977) theory that procrastination is related to the fear of failure. Unfortunately, there was no attempt to ascertain to what degree the students beliefs were irrational, as specified by Ellis and Knaus' theory. It could be that students simply avoided tasks that they had no ability to perform.

Trait Theory and Procrastination

A number of different personality traits and individual differences have been hypothesized to be related to procrastination. All of them are potentially useful contributors towards understanding of the behavior, and deserve some comment.

Procrastination and Ability. A study cited earlier is relevant to the discussion of procrastination and ability. Blatt and Quinlan (1967) found no significant differences between overall grade point average and procrastination. Newman, Ball, Young, Smith and Purtle (1974) found that procrastination was unrelated to grade-point average, and only insignificantly related to the final grade in a PSI class.

Several other studies appear in the literature supporting the hypothesis that procrastination is unrelated to ability. Rosati (1975) operationally defined procrastination as the number of modules completed in a self-paced engineering class. He found no difference between procrastinating and nonprocrastinating students' grade point average or mathematical ability, as measured by the Scholastic Aptitude Test. Taylor (1979) constructed a self-report questionnaire to distinguish procrastinators from punctual students. He found no difference between the two groups' grade point averages or WAIS scores. Aitken (1982) found that chronic procrastinators actually had slightly, though significantly, higher math SAT scores than punctual students. This led her to advance the hypothesis similar to that of Morris, Surber & Bijou (1978), namely that procrastination is more common in capable students who have

learned that they possess the cognitive abilities to perform the bulk of their course work at the last minute and still do reasonably well in school.

On the other hand, Ely and Hampton (1973) found that English ACT and a composite algebra achievement test score correlated negatively with procrastination, at least in PSI curriculum. It is important to note, however, that these researchers used a battery of 11 different achievement tests and found only two significant (.05) correlations. Of the 11 achievement tests utilized, none alone could predict procrastination. Furthermore, the multiple regression composite of tests utilized accounted for only a small portion of the total variance between procrastinating students and their more punctual peers. If there is a relationship between ability and procrastination it appears to be very limited, and perhaps somewhat transitory.

Low Achievement Motivation and Procrastination. Low negative correlations have been found between various nonprojective measures of achievement and chronic procrastination. Briordy (1980) found that students who self-reported frequent procrastination showed less achievement motivation, as measured by self-statements. Sweeny, Butler and Rosen (1979) report a negative correlation ($r = -.30$) between self-reported procrastination and achievement motivation, as measured by the Edwards Personal Preference Schedule (Edwards, 1957). Aitken (1982) found a correlation of $-.36$ between procrastination, as measured by her scale, and achievement motivation, as measured by the Personality Research Form (Jackson, 1967).

On the other hand, Taylor (1979) found no significant differences in achievement motivation between procrastinators and punctual students, as measured by the Mehrabian Achievement Scale. As with ability, if a relationship does exist between this variable and procrastination it appears to be somewhat elusive, perhaps more related to the instrument chosen to assess achievement, and to the nuances of the particular sample. Furthermore, when achievement motivation is found to be positively related to procrastination, the trait accounts for only a small portion of the observed variance.

Procrastination and the Locus of Control. Taylor (1979) suggests that a fertile ground for future research on procrastination might be in examining the relationship between the tendency to put things off and the concept of locus of control. To date, results have not been promising. Briordy (1980) found no relationship between self-reported procrastination and three different locus of control scales. Aitken (1982) found only an insignificant correlation between her scale measuring procrastination and the Rotter Locus of Control Questionnaire.

Impulsivity. Aitken (1982) found a small, though statistically significant correlation (.21) between self-reported procrastination and impulsivity. She considers this partial support for one theory of Ellis and Knaus' (1977), namely that procrastination is related to an inability to delay gratification. However, she is cautious to note that this relationship might be spuriously high. Her test measure, the Personality

Research Form, (the PRF) (Jackson, 1967) shows a high correlation between the subscale measuring achievement motivation, and "lack of impulsivity", as measured by another subscale. These subscales apparently are not orthogonal. Therefore, it is likely that the impulsivity detected by the PRF for procrastinators is the same factor as the lack of achievement the test also measures in procrastinators.

Procrastination, Anxiety, and Self-Esteem. Ellis and Knaus (1977) suggest that procrastination is related to a high level of anxiety in the procrastinator caused by unrealistic beliefs. Aitken (1982) attempted to test the first portion of this hypothesis that procrastination is related to an elevated level of anxiety. She correlated procrastination scores from her inventory with a measure of anxiety, the Taylor Manifest Anxiety Scale (Taylor, 1953). Procrastination scores correlated with this measure of anxiety only slightly (.21). Although significant, this correlation accounts for only approximately 5% of the variance observed in Aitken's measure. Furthermore, such a correlation tells nothing about the cause of procrastination. It is just as likely that students are anxious because their assignments are late, rather than their anxiety causing their assignments to be late.

Likewise, Aitken found a correlation of -.42 between "low-self concept" as measured by the Tennessee Self-Concept Scale (Fitts, 1965) and procrastination scores on her questionnaire. Whether procrastination is the cause or the result of low self-esteem is unknown.

An additional caveat is warranted when examining Aitken's data regarding anxiety and self-concepts. The Tennessee Self-Concept scale and the Taylor Anxiety Scale correlate highly (-.70) in Aitken's study. This suggests that the variables of self-esteem and anxiety are measuring a very similar dimension. Rather than claim that her research has demonstrated procrastinators to be both more anxious and possessing reduced self-esteem as Aitken attempts to do in her study (1982), it can only be said that Aitken's data seems to suggest a single factor of interpersonal anxiety related to a small, but significant portion of procrastination.


Procrastination and Differences in Time Perception

The most recent self-help book on procrastination (Burka & Yuen, 1983) suggests that procrastination is related to an inability to estimate time correctly. Burka and Yuen do not furnish any empirical data for this pronouncement, but draw upon their clinical experiences with a large number of college students in treatment for this problem.

As noted previously, Blatt and Quinlan (1967) found that procrastination was associated with a "present-oriented" time perspective. Wessman (1973) constructed a questionnaire to measure subjective feelings of the passage of time. A factor analysis of his scale revealed one factor similar to Blatt and Quinlan's (1967), tentatively labelled as "present vs future time orientation". The absence of this factor (i.e., a "present" orientation) was also associated with anxiety, helplessness, dependency, and low frustration tolerance.

This first factor appeared to be statistically independent of a second factor, pragmatically identified as "lateness". This second factor loaded high for questions pulling for ineffective use of time and lack of punctuality. It also was associated with guilt, anxiety, and feelings of inferiority, but without the imaginative fantasy and self-absorption characteristic of individuals whose responses clustered around the first factor. Gorman and Wessman (1977) admit that they are confused about the meaning of these factors, but urge future investigators to bear in mind that there is probably more than one dimension of procrastinating behavior.

Aitken (1982) attempted to correlate scores on her procrastination questionnaire with experimental measures of the passage of time. She administered her questionnaire to 120 students, and tested them on several measures of time estimation. No significant correlations were found between the procrastination scores and the following: students estimates of a period of a thirty second interval, intervals of four minutes, twenty minutes, and their estimates of how much time was left until the end of a class period. The only significant correlation she found was between the procrastination scores and students' estimates of how long they thought it would take them to do a required task (read a brief passage). Not surprisingly, procrastinators tended to underestimate time necessary to complete a task, while nonprocrastinators tended to overestimate this period.



However, Aitken (1982) admits at least one flaw in her research. Time estimates from subjects were obtained in a group setting, where subjects were free to obtain cues from peers, and even consult with classmates about their responses. Specifically, subjects were told to write down when they thought a given interval had passed. It seems reasonable that in a group setting they may have been influenced by watching the response interval of peers. Therefore, it is possible that Aitken's lack of significant findings for the interval estimation tasks is a function of the manner in which the experimental task was administered. To date, the hypothesized link between time estimation and procrastination suggested by Wessman (1973), and clinically observed by Burka and Yuen (1983) remains promising, yet still inadequately researched.

The Structural Account of Procrastination

The final approach to a theory of procrastination in the literature comes not from a psychologist, but from a social philosopher. Silver (1974), a "structural phenomenologist", has attempted an introspective explanation of the process of procrastination. Such an analysis takes as its reference-point the notion that the actions of individuals are a function of the "structure" of the act, rather than the personalities, attitudes or histories of the participants. This approach minimizes individual differences in behavior across similar situations, and highlights the situational differences that produce behavioral differences..

Delay in initiation
perseveration

Silver's (Silver 1974; Silver and Sabini, 1981) intuitive understanding of the process of procrastination is unduplicated in the psychological literature. He believes that procrastination can take either of two forms. The first is a delay in beginning a task, while the second is perseveration on a portion of a task that has been successfully completed. Silver maintains that the greater the ambiguity or complexity of a task requirement, the more the likelihood that the task will be procrastinated. Tasks that are cognitively complex, and involve multiple choices by the participant, are more likely to be put off than simple or highly structured ones.

Furthermore, Silver (1974) hypothesizes that stress, or distraction, causes a perseveration of performance of aspects of the task that are less complex. The greater the stress, the more the likelihood that the "actor" will perform a simple, cognitively uncomplex series of behaviors requiring little thought. Frequently, this occurs at the expense of performing more complex tasks necessary for goal completion. This tendency towards performing simple portions of the task is responsible for why certain tasks are procrastinated.

Silver (1974) maintains that individuals do not procrastinate acts that require immediate attention to attain a desired end. Even chronic procrastinators, he argues, are able to perform goal-oriented behavior as a deadline approaches. Therefore, rather than being defined as the avoidance of a task at hand, Silver believes a new definition of procrastination is required. Procrastination should be defined as the

Paraded

irrational forfeiting of the optimal time to begin goal-oriented action in order to maximize the likelihood that the project undertaken will be completed successfully.

As a correlative, Silver notes that procrastinators rarely abandon a project when they are avoiding it. Such an admission would be unacceptable. Instead, they busy themselves in an activity related to their goal, but not necessarily goal-directed. For example, the student procrastinating the writing of a masters' thesis is not likely to plan a summer vacation during the time he or she intends on completing the thesis. Such an action would be too removed from the goal, and would be a blatant admission of avoidance.

Instead, the procrastinator will spend the summer intended in completing the thesis in unnecessarily rereading the literature, or elaborately drawing up lists concerning what needs to be done to complete the task. Silver calls this phenomena "maintaining the procrastination field". As a result, Silver (1974) argues, one indication of procrastination is that a person "engages in activities that he would ordinarily find boring, trivial and even idiotic" (p. 51).

Silver's phenomenological description of the act of procrastination is essentially heuristic. It can be used to generate specific hypotheses regarding what kinds of events are likely to be procrastinated, and how procrastinators are likely to respond to these events. To date, however, there have been no attempts to test any aspect of Silver's theory.

In summary, although procrastination has been considered by a number of theorists from varying perspectives, very little empirical testing of these hypotheses concerning the etiology or supposed behaviors of procrastinators has been accomplished so far. Despite the fact that research has suggested that procrastination has a deleterious effect on up to 25% of college students, a tremendous number of rival or complementary hypotheses exist in the literature.

CHAPTER II

STATEMENT OF THE PROBLEMS AND HYPOTHESES

Validity of the Procrastination Inventory

Very little is known about the etiology of procrastinating behavior. One reason for the lack of psychological inquiry into this area appears to have been the lack of a suitable instrument to identify procrastinators (Taylor, 1979). Several popular authors and dissertations have attempted to construct questionnaires measuring procrastination (Green, 1981). Until recently, none of these discriminating devices was constructed utilizing any other method than that of choosing items for their face validity. Aitken (1982) has attempted to remedy this difficulty by designing a psychometrically valid questionnaire that discriminates procrastinating students from punctual ones. Aitken's questionnaire, the Procrastination Inventory, produces "procrastination scores" that correlate with several behavioral indicies of chronic academic procrastination in college students.

As mentioned in Chapter One, the distribution of these scores in her two samples of undergraduate students was approximately normal. These scores were then used to predict future academic behavior. Students scoring in the highest quartile of the questionnaire showed more

than twice as many behavioral indicators of procrastination problems as students in the lowest quartile during an academic semester. These indicators included delays in studying for tests, course incompletes, late library books, and even delays in mailing in an accompanying questionnaire for the study.

The Procrastination Inventory has not been cross-validated with another population outside of Aitken's (1982) original work. An important question for researchers to consider is whether this questionnaire can predict any behaviors associated with procrastination in an unrelated sample. Such a finding would be of use in establishing the criterion validity of this instrument, an important step if future research on procrastination is to use Aitken's measure, which to date is the only measure operationally defining procrastination.

Procrastination and Situational Time Constraints

A second question of interest to researchers in this area concerns to what extent procrastination is related to external time constraints. Missildine (1964) seems to have been the first author to have regarded procrastination as a permanent trait, a persistent personality pattern enduring across situations and due to intrapsychic, rather than external factors. Aitken (1982), Green (1981), Briordy (1980), Taylor (1979), the psychodynamic theorists, and to a lesser extent, even Ellis and Knaus (1977), consider procrastination to be a relatively enduring personality trait, relatively independent of environmental causes. However, as Cattell (1980) has argued, the labelling of a cluster of behav-

iors occurring together as a "trait" presupposes that a more parsimonious explanation for the observed behaviors is not possible. In other words, environmental causes of behavior should be exhausted before postulating intrapsychic explanations of behavioral syndromes. A more parsimonious, and certainly possible explanation is simply that academic procrastinators are normal individuals who are placed in circumstances where they simply do not have enough hours during the week to study.

The reasons for this lack of time could be myriad, but in general would relate to the pool of available hours an individual has per week to devote to school work. Those commuting a far distance, or forced to assume lengthy hours per week for outside employment, to name but two possible environmental influences, would probably have higher scores on a procrastination questionnaire. Individuals encumbered by these constraints simply would not have as much time to complete tasks as other students. Consequently, they might appear to possess more of the "trait" of procrastination. Rather than postulate a trait of procrastination, a more conservative approach attempts to explain the variance in scores measuring the "trait" of procrastination by considering environmental, rather than intrapsychic variables.

Procrastination and Extraversion

The rather limited procrastination literature that does exist has attempted to examine a number of personality variables hypothesized to be associated with the behavior. One variable not examined in any study has been that of extraversion-introversion. This is surprising, since

Taylor (1979) found that one of the reasons students claim they procrastinate is to engage in social activities. It seems reasonable that extraverts, who are by definition more sociable, would procrastinate more than introverts.

Eysenck (1981) has established the most reliable and valid measure of extraversion. He has marshalled an impressive array of evidence (1967; 1984) to argue that this personality trait is a fairly permanent dimension of individual difference, normally distributed, and closely tied to inherited biological factors. Extraverts, Eysenck argues, have reticular activating systems predisposed to inhibit familiar or less novel stimuli. Introverts do not show this primarily genotypically determined tendency.

The increased sociability of extraverts is but one manifestation of an excitation system quick to habituate. As a result, extraverts need more variety of stimuli, and at more frequent intervals than introverts to maintain similar levels of cortical arousal. Without this stimulation, extraverts have been shown to experience greater cognitive and physical fatigue, increased feelings of boredom and subjective distress, decreased attention span, an increase in perceptual errors, and a reduced level of general arousal (Eysenck, 1967). It can be hypothesized that because extraverts need a greater variety of stimulation than introverts, they would be more likely to be academic procrastinators. Extraverts are simply busy doing more things more often, sacrificing studying time for nonacademic pursuits.

Procrastination and Time Intervals

Research on procrastination needs to consider the ability of procrastinators to estimate time intervals. The clinical work of Burka and Yuen (1983) suggests that procrastination might be related to several different time estimation problems. For example, these authors suggest that procrastinators tend to lose track of the time, underestimate their time needs, and are particularly inadequate at knowing how long tasks will take them to perform.

More empirical studies also suggest that this area of research might be fruitful. Blatt and Quinlan (1967), in one of the first studies of procrastination, found that students with "future orientation", as measured by completions of sentence stems on a projective technique, showed less behavioral incidences of procrastination. in an undergraduate psychology class. Although Aitken (1982) found no correlation between scores on her scale and the ability to estimate passages of time, her methodology is suspect. This criticism argues for repeating the portion of her experiment related to estimations of time by procrastinators.

Aitken did, however, find that scores on the Procrastination Inventory correlated positively with how long students thought it would take them to complete an academic task, a brief reading passage. She urges replication of her findings, because of her concern that students in her study may have collaborated in producing their time estimations. The relationship between procrastination and estimation of time for com-

pletion of an academic task would seem to be an important area for procrastination research to consider.

The time estimation literature (Fraisse, 1984) has suggested that the ability to judge time intervals is a complex skein of capacities, many of which do not correlate well across diverse tests of measurement. The most popular time estimation tasks employed in laboratory settings are "interval naming" types (Davidson & House, 1982). This type of task, employed by Aitken in her study, requires subjects to name the length of a prescribed and presented period of time. Aitken employed three such intervals, a brief one of twenty seconds, an interval of four minutes, and a longer one of twenty minutes.

The literature suggests that a different type of time estimation task other than just interval naming might be appropriate for procrastination research. Wessman's (1973) factor analytic study suggests that previous laboratory tasks may have failed to sufficiently tap the dimensions associated with procrastination. Wessman's first factor, labelled as "chronic lateness" was associated with the subjective feeling that "time is flying". Interestingly, this factor loaded poorly on inaccuracies of laboratory estimates of brief-to-moderate time intervals. Some subjects could estimate moderate intervals of time reasonably accurately. However, when interval estimates were obtained by requiring subjects to estimate the actual clock time, these estimates were quite poor. For example, subjects could state that an experiment had been half an hour long, being accurate within a few minutes. However, these same

subjects, when asked what time the clock said, would give an answer congruent with a much different and inaccurate interval estimate.

The feeling that time is flying would seem to be more associated with an inability to accurately estimate a time interval relating to what Wessman has called "real clock time", rather than that of an artificially constructed interval. Wessman's findings of at least two orthogonal factors related to time estimation suggest that a measure deriving from a task asking subjects to name the clock time might produce different results than that of interval naming. It seems likely that procrastinators will tend to underestimate the actual clock time following an experimental session, as well as underestimate the passage of specific intervals. Both types of experiments are worthy of empirical examination.

Procrastination and Task Complexity

A final promising area for inquiry concerns Silver's (1974) hypothesis that procrastination is related to task complexity. Although psychologists are oriented more towards finding differences in behavior across identical situations, Silver's belief that the structure of the task influences its avoidance by the procrastinator is an interesting hypothesis. Combining it with a nomothetic approach, it could be hypothesized that procrastinators are individuals who demonstrate a preference for performing portions of the task that are simple or more structured. Nonprocrastinators are individuals less likely to show this preference for the simple portions of a task.



Silver's theory also predicts that as stress or distraction increases, all individuals show a tendency to perform the cognitively simpler portions of a task. On the other hand, nomothetically oriented psychologists would be more inclined to argue that an interaction should be found between procrastination and the tendency to perform easier portions of the task under stressful conditions. Some individuals are predisposed to procrastinate more than others. Consequently, they should *even at 100% stress* show a consistent preference for simpler portions of tasks. Under conditions of distraction or stress, this tendency will increase for everyone, becoming more pronounced in people predisposed to procrastinate. This modification of Silver's theory represents a testable hypothesis that could contribute greatly to the present understanding of procrastinating behavior.

Hypotheses

On the basis of the previous discussion, a number of hypotheses can be advanced. Hypothesis I concerns the relationship between scores on the Procrastination Inventory and students' total of self-reported hours per week spent studying. The null hypothesis is that students identified by the questionnaire as procrastinators will not differ significantly from nonprocrastinators in total hours reported as spent studying. The experimental hypothesis is that students identified as procrastinators will report less hours per week studying than nonprocrastinating peers.

Hypothesis II concerns extraversion scores and procrastination. The null hypothesis is that procrastinators will not show significantly different extraversion scores than nonprocrastinators. The experimental hypothesis is that procrastinators will show higher extraversion scores than nonprocrastinators.

Hypothesis III and IV concern environmental factors that might account for some of the observed variance in procrastination scores. Hypothesis III attempts to account for the variance by suggesting a relationship between procrastination and commuting time. The null hypothesis is that procrastinators will report no significance difference in commuting time from nonprocrastinators. The experimental hypothesis is that procrastinators will report significantly more time commuting than nonprocrastinators.

Similarly, hypothesis IV attempts to account for a portion of the variance of procrastination scores by suggesting that such scores are, in part, a function of hours students work outside of school in a non-academic setting. The null hypothesis states that procrastinators will report no significant difference in the number of hours they are engaged in nonacademic employment from nonprocrastinators. The experimental hypothesis states that procrastinators will report significantly more hours per week working in nonacademic employment settings than nonprocrastinators.

Hypothesis V and VI concern the comparative ability of procrastinators to estimate intervals of time. Hypothesis V suggests that pro-

crastination is related to an inability to estimate a moderate length of time. The null hypothesis is that procrastinators will not differ significantly in their estimation of a moderate interval of time from non-procrastinators. The experimental hypothesis is that procrastinators will significantly underestimate a moderate interval of time compared with nonprocrastinators.

Hypothesis VI concerns the relationship between procrastination and an inability to estimate a moderate ability of time while under conditions of distraction. The null hypothesis is there will be no difference between distracted and nondistracted procrastinators in their estimate of a moderate length of time. The experimental hypothesis is that distracted procrastinators will significantly underestimate the passage of a moderate interval of time, compared with nondistracted procrastinators.

Hypothesis VII to IX concern the procrastination and time estimates to complete a task. Hypothesis VII examines this hypothesized tendency across experimental conditions. The null hypothesis is that procrastinators will show no significant difference from nonprocrastinators in their estimation of how long it will take them to complete a reading passage. The experimental hypothesis is that procrastinators will estimate significantly less time complete a reading task compared to nonprocrastinators.

Hypothesis VIII concerns the interaction between procrastination and distraction, and time estimation to complete a reading passage. The

null hypothesis states that distracted procrastinators will not significantly differ from nondistracted procrastinators in their estimates of time necessary to complete a reading task. The experimental hypothesis is that distracted procrastinators will estimate significantly less time to complete a reading task, compared with nondistracted procrastinators.

Hypothesis IX concerns the relationship between the estimated time of task completion and the actual time needed. The null hypothesis states that there will be no difference between procrastinators and non-procrastinators in the correlation of estimated time and actual time needed to complete a reading task. The experimental hypothesis is that nonprocrastinators will show a significantly higher correlation between estimated time necessary to complete a reading task and actual time necessary to complete the task.

Hypotheses X and XI concern the ability of procrastinators to accurately estimate the real clock time. Hypothesis X examines differences between procrastinators and nonprocrastinators. The null hypothesis is that procrastinators will shown no difference from nonprocrastinators in an estimation of the real clock time. The experimental hypothesis is that procrastinators will estimate less real clock time, compared with nonprocrastinators.

Hypothesis X examines the interaction between conditions of distraction and the inability to accurately estimate real clock time. The null hypothesis is that distracted procrastinators will show no significant difference from nondistracted procrastinators in their estimates of

the real clock time. The experimental hypothesis is that distracted procrastinators will estimate less real clock time than nondistracted procrastinators.

Hypotheses XII and XIII examines Silver's (1974) claim that procrastination is related to the tendency to choose portions of a task labelled as cognitively simpler. Hypothesis XI tests this claim for procrastinators and nonprocrastinators. The null hypothesis is that procrastinators will show no preference for beginning a task with portions labelled as cognitively simple. The experimental hypothesis is that procrastinators will show a tendency to begin a task by performing a portion of the task labelled as cognitively simple, compared with nonprocrastinators.

Hypothesis XIII suggests that an interaction will be found between procrastination and conditions of distraction. The null hypothesis states that distracted procrastinators will not differ significantly from nondistracted procrastinators in preference for beginning a task with portions labelled as cognitively simpler. The experimental hypothesis states that distracted procrastinators will show a significant preference for starting a task with portions labelled as cognitively simpler, compared with nondistracted procrastinators.

Although these hypotheses are rather numerous, all are amenable to inquiry utilizing the Aitken (1982) Procrastination Inventory. Due to the present lack of knowledge regarding the behavior of procrastinators and the underlying psychological processes involved with this pervasive

problem, the number of hypotheses advanced in this rather small project is not unreasonable. Taken together, they will add substantially to the present knowledge about the causes and behaviors of procrastinators.

CHAPTER III

METHOD

Subjects

One hundred ninety-nine undergraduate students of Loyola University of Chicago volunteered for the experiment. Participation was solicited beginning the third week of second semester of the school year, and continued until four weeks prior to the end of classes. Students participating received required course credit for introductory psychology. By gender, these students included 111 women (mean age 18.72 years) and 88 men (mean age 19.11 years).

Subject Selection with the Procrastination Inventory

Two phases of the experiment were conducted. The first phase involved screening subjects for the second phase, the experimental session, by the administration of Aitken's (1982) Procrastination Inventory to all 199 subjects. Students signed up for one of 27 possible administrations of the questionnaire. To accommodate diverse scheduling needs of subjects, questionnaire administration was conducted on numerous times between 8 A.M. and 5.30 P.M. throughout the semester, and on all week days. Students were administered the questionnaire in groups of between three and eighteen, depending upon popularity of the time slot in question.

Students scoring in the highest and lowest quartiles of Aitken's Procrastination Inventory were operationally defined as procrastinators and nonprocrastinators, respectively. These cut-off points were suggested by Aitken (1982), in her original study. Because it was desired to balance group sizes to reflect gender differences, the cut-off scores for men and women were slightly different. This procedure was also utilized by Aitken to balance gender differences in experimental groups. For females, a score of 36 or below was necessary for designation as nonprocrastinator, while a score of 53 or greater was required for labelling as a procrastinator. For males, a score of 38 or below was sufficient for the label of nonprocrastinator, while a score of 54 or higher was necessary for labelling as procrastinator.

Since the operational definition of procrastination was contingent upon quartile cut-offs which were difficult to estimate completely in advance, thirty-nine more students than necessary were administered the questionnaire. Of these, 22 met the criteria of being defined by the questionnaire as either procrastinator or nonprocrastinator. Five students meeting the above criteria (three nonprocrastinating females and two nonprocrastinating males) participated in the first portion of the study, but had sufficient credits to forgo participation in the experimental phase of the study. Nine students could not be located for follow-up experimental testing, despite their initial scores meeting the operational definitions established by the quartile cut-offs. The remaining eight students, all of whom qualified as either procrastina-

tors or nonprocrastinators, were scheduled as "back-up" subjects for the second phase of the experiment, since their questionnaire scores bordered on cut-off criteria employed by Aitken. These students received course credit for participation in this phase, although no data was collected on their participation.

Design

A 2 (procrastination) X 2 (distraction) X 2 (gender) design was employed. In all, eighty subjects were selected, twenty procrastinating males, twenty procrastinating females, twenty nonprocrastinating males and twenty nonprocrastinating females. These groups of twenty were additionally divided randomly into two equal-sized groups, one to receive the experimental condition of distraction, and the other to serve as the control group. In total, forty subjects received the distraction condition: ten procrastinating males, ten procrastinating females, ten nonprocrastinating males and ten nonprocrastinating females. Forty subjects also received the control conditions: ten procrastinating males and ten procrastinating females, as well as ten nonprocrastinating males and ten nonprocrastinating females.

Materials

The Procrastination Inventory

To differentiate procrastinators and nonprocrastinators, Aitken's Procrastination Inventory (1982) was administered. This questionnaire consists of 19 items designed to be embedded in a larger "dummy" ques-

tionnaire. Aitken claims that the reliability and validity of the questionnaire are not influenced by the variety of items serving to imbed the differentiating questions, although the questionnaire as it appeared in this study patterned Aitken's directly. Aitken reports a coefficient alpha of .85 for the questionnaire. No other reliability information is included in her study. Appendix A contains the Procrastination Inventory and its keyed answers.

Extraversion Measure

Accompanying the Aitken Inventory were 36 items taken from the Eysenck Personality Inventory (Eysenck & Eysenck, 1979). Twelve of the items selected were those that are reported to load the highest for the factor of extraversion. The validity of utilizing a shorter version of the extraversion scale developed by examining the factor loadings has been suggested by Eysenck (1967) as an appropriate technique to facilitate time savings, with little or no loss in differentiating properties of the total scale. Appendix B contains the 12 items scored for extraversion in this study.

Additional Questions Administered

Additional data was also collected at the time of administration of the procrastination questionnaire and the Eysenck Personality Inventory. Nine questions were added to the above two scales. These included a question about commuting time, hours spent studying, age, year in school, courseload (in semester hours), hours spent working outside of

school, academic major, and subject gender. Appendix C contains the additional information requested from subjects in the study.

The Distraction Measures

To serve as a manipulation check, 13 items from Cattell's Eight State Anxiety Questionnaire (1978) were administered. Only two subscales of the questionnaire were utilized, since Cattell's previous data (1973) suggests that each of the eight subscales of this questionnaire measures different components of anxiety. Several of the subscales on the measure not employed in this study are primarily measures of physiological correlates of anxiety and fear (such as heart palpitations, dry mouth, and sweaty palms). Since the goal of the manipulation (see below) was to distract subjects, and not to frighten them, only the two subscales most sensitive to measuring cognitive distraction were included. These include one six item scale specifically designed to measure a tendency towards increased errors in thinking due to external distractors and stressors. They also include a seven item subscale constructed to measure the tendency of individuals to attempt simpler solutions to problems when faced with external stressors. Cattell claims that these two subscales can be used alone to effectively assess the effects that environmental distractors have on individuals in distracting or stressful situations.

The Eight State Questionnaire is scored numerically. Subjects can choose any one of four graded answers corresponding to increasing levels of subjective distress (Cattell, 1978). Approximately half of the items

on each subscale are written to be scored in an inverted fashion, since the wording on these items is constructed to the absence of perceived stresses. Scores range from zero to three for each item, giving each subscale a range from zero to 18, and zero to 21 respectively. Although one version (Cattell, 1978) of the subscales include a possible "Can't Say" response, Cattell (1973) does not believe this answer is necessary for a college population with experience answering multiple-choice questionnaires. Consequently, it was eliminated from the questionnaire by the present experimenter.

Two versions of the Cattell subscales were administered. One was in the present tense for administration before the experimental manipulation. The other was identical, except written in the past tense. This version was administered after the experimental session. Appendices D and E contain the questionnaires as they appeared to subjects.

Anagram Tasks

To serve as a cognitive task with clearly defined levels of difficulty, subjects were required to solve anagrams. The use of anagrams as an analogue to less controlled cognitive tasks has a lengthy history in laboratory research (Woodworth, 1938). The anagrams used for this experiment were obtained from two normative lists by Mayzner and Tresselt (1962; 1965). Two separate groups of anagrams were used. The first was composed of five selections from the Mayzner and Tresselt lists. Two anagrams were easily solvable, with median solving times of less than 10 seconds, according to Mayzner and Tresselt's data. Two were mod-

erately difficult, with median times to solve of 15 to 30 seconds. One anagram, generated by the experimenter, was unsolvable.

The second group of anagrams were graded in approximate level of difficulty from additional norms furnished by Mayzner and Tressalt. Ten anagrams were employed, with the easiest marked 0%, the next hardest, according to mean solving time, labelled 10%, etc. These labels extended all the way to 90%. Anagrams for both portions of the task, as well as their median reaction times as reported by Mayzner and Tresselt (1962; 1965) are listed in Appendix F.

The Audio Distraction Manipulation

To serve as a distraction manipulation, one-half of subjects performed their task while listening to a cassette tape. Although a loud, continuous noise has been demonstrated to have the greatest distracting impact on subject performance (Broadbent, 1957), this manipulation was rejected as being potentially harmful to subjects. Instead, a distraction based upon audio unpredictability (Teichner, Arees, & Reilly, 1963) was employed. Teichner et al have demonstrated that a significant degree of cognitive distraction can be produced by requiring subjects to perform a task while listening to sounds varying from source and in predictability.

To produce such audio unpredictability, a stereophonic cassette tape was constructed. The tape was composed of multiple series of randomly positioned 10 second segments of piano music by the composer John Cage, bagpipe music, flute music by the jazz composer Sun Ra, and vocal

selections by the punk rock musical group Black Flag. Music was played on a portable stereophonic cassette tape player. The cassette tape was recorded with these compositions played in reverse on a belt-drive turntable modified for this purpose. The cassette was then duplicated, and different portions of the two cassettes were simultaneously recorded stereophonically on a third stereo cassette, each of the original cassettes being recorded on one channel. In this manner, two diverse and backward selections were presented binaurally. Selections were played with a Scintrex SX6210 stereo headphone set adjusted to maximum volume and treble tone. Both treble and loudness knobs were removed from the headphones to prevent students from altering the sound quality.

Reading Passage and Accompanying Questionnaire

Subjects were required to complete a brief reading passage of three paragraphs and 561 words from Edmund Wilson's book On Human Nature (1978, pp. 160-161). To be certain that the subjects actually read the passage, students were told that they would have to complete a brief questionnaire about the reading. Following the reading, students were given a four item multiple-choice questionnaire, composed of simple questions anticipated to be answerable to anyone who had read the passage. These questions are reproduced in Appendix G.

Procedure

Subjects participated in either one or two sessions. The first session involved group administration of Aitken's (1982) Procrastination

Inventory and is described above. Subjects that met the quartile cut-offs were personally contacted and asked to return for the second portion of the experiment.

Students who met the criteria for inclusion in the second phase of the experiment were scheduled individually for the second session. Students were scheduled approximately one week in advance, and given a reminder call the day before the experiment by the experimenter's associate. Although the experimenter was not truly "blind" to subject procrastination scores, he did not allow himself access to the scores from the time of subject selection for the second part of the experiment until after the subject had successfully completed the second portion. Similarly, the experimenter did not allow himself access to the names of individual subjects from the time of their scheduling for the second session until after their completion of the experiment. In this manner, any association of scores with subject names was diluted.

Subjects were individually accompanied to the laboratory, seated comfortably, and asked to remove any coats or cumbersome items. Students were then engaged in approximately one minute of friendly conversation, asking them questions concerning their majors, hobbies, other classes that they were taking. Following this, these instructions were read verbatim:

We are going to be doing several tasks today. They will take between ten minutes and one hour. Right now it is (the actual time was read). Since this is a laboratory, I will have to ask you to remove any watches or very loose fitting rings you have and put them in your pocket or on the cart in front of you. The first thing we are going to do is fill out a questionnaire.

At this time subjects were given the Cattell questionnaire. Following completion of the questionnaire the following instructions were read:

We are now going to solve some anagrams. An anagram is simply a scrambled word. For example, if I showed you this word (the letters "bta" were presented on a 3x5 unlined, white card) you could probably tell that it was the word bat.

This one is a bit harder, but most people can get it if they try. (The letters "l-a-c-l" were presented on a similar card. If the subject failed to understand the task, the anagram "hti" for "hit" was presented and subsequently explained).

That one was "call", c-a-l-l. Next I'm going to show you five anagrams. Some are easy, some are very hard. No one is expected to solve all of them. I am going to show them to you for thirty seconds each, unless you solve them first.

During this experiment you will be wearing these headphones. You may or may not be hearing any sounds from them. Why don't you put the headphones on, and get comfortable with them?

At that point subjects were assisted in putting on the headphones. Subjects in the low distraction condition heard a blank, unrecorded tape, played at approximately 30db (slight audibility). Subjects in the distraction condition listened to the experimental tape played at approximately 65 db (loud conversational level).

Subjects listened to the headphones for approximately ten seconds before the first group of anagrams were presented. Subject responses were recorded for the series of five trial anagrams, including the one unsolvable word. Following completion of the task, the tape was placed in the pause position.

Subjects were then asked to verbally estimate, as accurately as possible, how many minutes they had been in the laboratory with the

experimenter. This response was noted. Subjects were then instructed as follows:

You are going to solve some more anagrams. In my hand I have ten anagrams, each with a different number on the back. The first one has a zero on it. It is the easiest. (The anagram was laid at the top of a desk table, face up, in the left corner). The second anagram, labelled 'one' has a 10% on it. It is a bit harder. I'll put it right next to the easier one. The next one, two, has a 20% on it, and its harder still. They go all the way up to number nine, rated at 90%, which is the hardest, though not quite as hard as the one you couldn't solve a few moments earlier.

I'm going to ask you to start to solve these anagrams. All of them are solvable, and there is no time limit. Unlike what we just did, you can spend as long as you need. Furthermore, you can solve them in any order you want. You can start with 90% and work your way down to the easiest. Or you can begin with zero and work your way up. You are free to start in the middle and work your way up or down. You can skip around if you choose. It is entirely up to you.

However, before you begin, I want you to take 30 seconds and figure out the order you want to solve them in. In other words, before you begin, I want you to pick out which one you want to solve first, which one second, which one third, and so on until you've completed them all. Pick the one you want to solve first, and then hand it to me. Then hand the one you want to do second to me, until you have given them all to me. Are there any questions?

At that point any questions were answered, and orders of preferences were recorded for anagram selections.

Subjects were given three anagrams to solve, after which they were interrupted. They were then instructed that they were to read the book passage. Instructions were as follows:

Before you finish the anagrams, I'd like you to do something else. This is a book passage, containing 514 words. It is about as difficult as you would find on the SATs or ACTs. Your task will be to read it and answer four brief questions concerning the reading. Here is the passage. Why don't you take a look at it? (Subjects were given a ten seconds to scan the passage once over).

Before you begin reading it, I want you to write down, as accurately as you can, how many minutes and seconds you believe it

will take you to read the passage. You can take as long as you want, but I want you to try to estimate as near to how long you'll need as possible. Are there any questions? Keep in mind that you will be wearing the headphones during the reading, hearing similar sounds in them to what you heard earlier.

At that point questions were answered, and subjects were handed a sheet of paper to record their time estimates. Subjects read the passage and completed a brief four item questionnaire about the readings. Following this, subjects (with headphones remaining on) were instructed to finish solving the anagrams.

At the conclusion of the anagram task, subjects were asked to remove the headphones. The second version of the Cattell questionnaire was administered. Following the questionnaire these instructions were read:

This experiment is just about over. However, there is one last task. When you came into the room, I announced that it was (the previous time was reiterated). As accurately as you can, I want you to write down what time it is now. If you could look at the clock now, what would it say?

At that point, the subject response was noted and the actual clock time was recorded. The experimenter then announced the experiment was over, debriefed the subjects, and asked them to remain silent to peers until the end of the semester about the nature of the task.

CHAPTER IV

RESULTS

Predictive Validation of the Aitken Measure

Procrastination Scores and Hours Reported as Studying

Hypothesis I concerns the usefulness of Aitken's Procrastination Inventory in predicting academic procrastination. The experimental hypothesis stated that individuals scoring in the highest quartile of the questionnaire (students operationally defined as procrastinators) would report less total hours per week studying than students scoring in the lowest quartile, (those who are operationally defined as nonprocrastinators). This hypothesis is supported by the data.

Table 1 shows the mean hours per week reported as studying by procrastinators and nonprocrastinators, reported by gender. The mean number of hours reported by all subjects for hours studying is 24.13 hours, with a standard deviation of 14.51 hours. For males, this number is 22.80 hours, with a standard deviation of 10.66 hours. For females, this number is 25.47 with a standard deviation of 17.58 hours.

For procrastinating males, the mean number of hours reportedly studying is 22.00, with a standard deviation of 10.12. For nonprocrastinating males, the mean number of hours reported as spent studying is 23.60, with a standard deviation of 11.35. For procrastinating females,

the mean number of hours reported was 25.47, with a standard deviation of 17.58. For nonprocrastinating females, the mean number of reported hours is 31.60, with a standard deviation of 20.57 hours.

A 2 (procrastination) X 2 (gender) analysis of variance showed that the main effect of procrastination is significant, $F(1, 76) = 6.07, p < .05$. No significant gender differences are found, $F(1, 76) = 1.44, p < .25$. Nor is there a significant interaction between gender and procrastination on total hours reported studying, $F(1, 76) = 3.03, p < .10$.

Procrastination and Semester Hours of Enrollment

Since hours studying per week hypothetically relates to the total semester hours a student is carrying at the time, it is logical to assume that a more accurate relationship between procrastination and hours spent studying can be obtained by covarying total hours reported studying by the semester hours a student is enrolled. This is likely to change the variance estimates for both groups, providing there are significant differences between groups on the measure being covaried (Winer, 1971).

Table : 1

Mean Hours Studying by Procrastination and Gender

Group	<u>Hours Reported Studying Per Week</u>	
	Mean	SD
Total Population	24.31	14.51
Males	22.80	10.66
Females	25.47	17.57
Procrastinators	23.74	13.85
Male	22.00	10.12
Female	25.47	17.58
Nonprocrastinators	27.60	15.96
Male	23.60	11.35
Female	31.60	20.57

Differences in academic loads between procrastinators and nonprocrastinator were indeed found. Procrastinators reported being registered for less academic hours than nonprocrastinators. For both groups, the mean hours registered is 16.4, with a standard deviation of 2.13. For procrastinating males the figure is 15.67, with a standard deviation of 2.15. For procrastinating females, the figure is 15.3, with a standard deviation of 2.45. For nonprocrastinating males, the mean hours taken is 17.25, with a standard deviation of 1.29. For nonprocrastinating females, the mean semester hours enrolled is 17.00, with a standard deviation of 2.36.

The difference between academic hours taken for procrastinators and nonprocrastinators is significant, $F(1,76) = 10.21, p < .01$. No significant difference was found for the main effect of gender $F(1,76) = 1.21, p < .30$. Nor did the interaction between gender differences and procrastination have a significant effect on academic hours taken by students, $F(1,76) = .34, p < .6$.

Study Time Adjusted by Semester Hours of Enrollment

Covarying by academic hours taken, there is still a significant difference between hours spent studying per week by procrastinators and nonprocrastinators, $F(1,76) = 4.17, p < .05$. Again, there are no significant gender differences, $F(1, 76) = .712, p < .40$, nor interaction between gender and procrastination, $F(1, 76) = 2.83, p < .10$.

Thus, whether or not one covaries the number of hours spent studying by the students' semester hours carried, procrastinators report

studying significantly less than nonprocrastinators. These findings support hypothesis I, that individuals scoring high on Aitken's measure of procrastination will report less total hours per week studying than individuals scoring low on the Aitken questionnaire.

Procrastination and Extraversion

Hypothesis II concerned the anticipated relationship between extraversion scores, as measured by 12 items from the Eysenck Personality Inventory, and scores on Aitken's Procrastination Inventory. The experimental hypothesis stated that those scoring in the top quartile of Aitken's measure would have higher extraversion scores than those scoring in the lowest quartile. This hypothesis is supported by the data. Table 2 shows the mean and standard deviations of extraversion scores of procrastinators and nonprocrastinators, reported by gender. For both groups, the mean extraversion score is 4.70, with a standard deviation of 2.05. For procrastinators, the mean score is 5.40, with a standard deviation of 1.82. For nonprocrastinators the mean is 4.00, with a standard deviation of 1.97. For procrastinating males, the mean is 5.00 with a standard deviation of 1.74. For procrastinating females, the mean is 5.80, with a standard deviation of 1.98. For nonprocrastinating males, the mean is 4.10, with a standard deviation of 1.86. For nonprocrastinating females, the mean is 3.90, with a standard deviation of 2.14.

A 2 (procrastination) X 2 (gender) analysis of variance found a main effect for procrastination on extraversion scores, $F(1,76) =$

Table 2
 Extraversion Scores and Procrastination

Extraversion Scores from the Eysenck Scale

Group	Mean	SD
Total Population	4.70	2.05
Procrastinators	5.40	1.82
Male	5.00	1.74
Female	5.80	1.98
Nonprocrastinators	4.00	1.97
Male	4.10	1.86
Female	3.90	2.14

High scores mean a larger measure of extraversion.

10.38, $p < .01$. No significant main effect was found for the effects of gender on extraversion scores, $F(1, 76) = .47$, $p < .5$. Nor was a significant two-way interaction between gender and procrastination found to effect extraversion scores, $F(1, 76) = 1.35$, $p < .30$.

This finding can be taken as support for the hypothesis that those scoring in the highest quartile of the Aitken Procrastination Inventory, the procrastinators, have higher extraversion scores on a twelve item measure of extraversion from the Eysenck Personality Inventory than individuals scoring in the lowest quartile. Thus, the hypothesis that procrastinators are significantly more extraverted is supported by the data.

Procrastination and Situational Constraints

Procrastination and Commuting Time

Hypothesis III and IV concerned the relationship between situational time constraints and their impact on scores of Aitken's Procrastination Inventory. Hypothesis III stated that individuals who score in the highest quartile of the Procrastination Questionnaire would report spending more time commuting to campus than nonprocrastinators. This hypothesis was not supported by the data. Table 3 shows the mean and standard deviation of reported commuting time for procrastinators and nonprocrastinators, broken down by gender.

The total minutes commuting time reported for all subjects is 26.77 minutes, with a standard deviation of 23.09 minutes. For procrastinators, the total commuting time is reported as 25.40 minutes, with a

standard deviation of 24.68 minutes. Procrastinating males reported a total commuting time of 20.20 minutes, with a standard deviation of 16.83. Procrastinating females reported a commuting time of 30.70, with a standard deviation of 30.14 minutes. Nonprocrastinators reported a total commuting time of 28.10 minutes with a standard deviation of 21.62 minutes. Nonprocrastinating males reported a commuter time of 25.72 minutes, with a standard deviation of 30.41 minutes.

Nonprocrastinating females reported a commuter time of 30.45 minutes, with a standard deviation of 23.05 minutes. The large standard deviations associated with each figure of commuter time are due to the fact that residents in the university dormitories had commuter times averaged with students who lived off of campus. Because of this, any significant differences between groups would be unlikely.

A 2 (procrastination) X 2 (gender) analysis of variance failed to find a main effect for either independent variable, or a significant interaction effect. The mean differences in groups are actually in the opposite direction than those hypothesized, though not significant, $F(1,76) = .262, p < .65$. Although the gender differences in commuter time appeared large, an analysis of variance showed that these differences are not significant, $F(1,76) = 2.15, p < .15$. The two way interaction between procrastination and gender also is not significant, $F(1,76) = .31, p < .60$. Thus, it appears that individuals who score in the highest quadrant on the Aitken Procrastination Inventory do not report commuting longer to campus.

Table 3

Commuting Time and Procrastination

<u>Commuting Time (in minutes per day)</u>		
<u>Group</u>	<u>Mean</u>	<u>SD</u>
Total Population	26.77	23.09
Procrastinators	25.40	24.86
Male	20.20	16.83
Female	30.70	30.14
Nonprocrastinators	28.10	21.62
Male	25.72	30.41
Female	30.45	23.05

Procrastination and Nonacademic Employment

Hypothesis IV stated that procrastinators would report more time engaged in working in a nonacademically related setting than nonprocrastinators. This hypothesis is also not supported by the data. Table 4 shows the means and standard deviations of reported employment time of procrastinators and nonprocrastinators, broken down by gender.

The combined number of hours reported as working in nonacademic employment by all students is 7.95 per week, with a standard deviation of 6.72 hours. Procrastinators reported working in nonacademic employment 7.97 hours per week, with a standard deviation of 7.36 hours. For male procrastinators, this figure was 8.55 hours, with a standard deviation of 7.96 hours. For female procrastinators, the figure is 7.40 hours, with a standard deviation of 6.87 hours.

Nonprocrastinators reported working 7.92 hours per week, with a standard deviation of 6.21 hours. Nonprocrastinating males reported working 7.25 hours a week, with a standard deviation of 6.17 hours, while nonprocrastinating females reported working 8.61 hours, with a standard deviation of 6.35 hours.

A 2 (procrastination) X 2 (gender) analysis of variance was performed on the data. The effects of procrastination were not significant, $F(1, 76) = .01, p < .99$. Significant gender differences were also not found, $F(1, 76) = .004, p < .95$. Nor is the two-way interaction between gender and procrastination significant $F(1, 76) = .62, p < .41$.

Table 4

Employment Hours and Procrastination

Group	<u>Total Hours of Employment Per Week</u>	
	Mean	SD
Total Population	7.95	6.72
Procrastinators	7.97	7.36
Male	8.55	7.96
Female	7.40	6.87
Nonprocrastinators	7.92	6.21
Male	7.25	6.17
Female	8.61	6.35

Thus, the hypothesis that individuals who score on the highest quartile of Aitken's Procrastination Inventory would report being employed more hours per week in a nonacademic setting than individuals scoring in the lowest quartile is not supported. This finding can be seen as support for the statement that procrastination, as measured by Aitken's Procrastination Inventory is unrelated to total hours a student is employed per week. Nor are procrastination scores, as measured by Aitken's measure related to students' total time reported as commuting. Care should be taken, however, in interpreting the latter statement, since the pooling of commuter times from on and off-campus students has increased the standard deviation of both procrastinators and nonprocrastinators to the point that finding differences between these two groups would have been statistically unlikely.

Procrastination and Estimations of Time

The Effects of the Distraction Manipulation

The Main Effect of Distraction. The next hypotheses involved a manipulation of distraction. To serve as a manipulation check, scores from the second administration of Cattell's Eight State Questionnaire (1978) were subtracted from the scores obtained on the pretask administration of the Cattell Questionnaire. In this case, a higher score is associated with more distraction and difficulty in processing information due to environmental disruptions (Cattell, 1973). A general increase in scores was anticipated, due to the sensitivity of the ques-

tionnaire to the stress of the experimental situation (Cattell, 1978). However, it was reasoned that if the experimental manipulation of audio distraction was successful in generating significant distraction, an analysis of variance for gain scores (Cook & Campbell, 1979) should show greater increase of scores for individuals in the distraction condition regardless of their status as a procrastinator. Indeed, these results were found. Table 5 shows the breakdown of these changes in scores by conditions of distraction, by gender and status of procrastination.

For all subjects the mean distraction questionnaire score is 8.71, with a standard deviation of 7.52. The mean score for all subjects in the distraction condition is 13.35, with a standard deviation of 7.02. Distracted males have a mean score of 15.75, with a standard deviation of 6.27. Distracted females have a mean score of 10.95, with a standard deviation of 7.00.

Nondistracted subjects have a distraction score of 4.07, with a standard deviation of 4.65. Nondistracted males have a mean score of 3.85, with a standard deviation of 4.23. Nondistracted females have a questionnaire score of 4.30, with a standard deviation of 5.15.

A 2 (distraction) X 2 (procrastination) X 2 (gender) analysis of variance was performed on these score changes. Notable is the fact that a main effect is found for the condition of distraction, $F(1,72) = 52.92$, $p < .001$. Subjects in the distraction condition show a significantly larger mean increase in their anxiety scores, as compared to subjects in the nondistraction condition. As expected, no main effect is

Table 5

Distraction Scores, Gender, and Procrastination

	<u>Change in Distraction Scores</u>	
Group	Mean	SD
<hr/>		
Total Population	8.71	7.52
By Distraction		
Distracted Subjects	13.35	7.02
Males	15.75	6.27
Females	10.95	7.00
Nondistracted Subjects	4.07	4.65
Males	3.85	4.23
Female	4.30	5.15
By Procrastination		
Procrastinators	8.27	6.08
Males	9.85	6.70
Females	6.70	5.07
Nonprocrastinators	9.15	8.80
Males	9.75	9.31
Females	8.55	8.44
By Gender		
Males	9.80	8.01
Females	7.62	6.94

Note: scores represent mean increases of distraction scores from first administration of Cattell's Eight State Questionnaire to the second, post-session administration. All Scores are positive.

found for the effects of procrastination on stress questionnaire scores, $F(1,72) = .268$ $p < .60$. This suggests that procrastinators do not have a pre-experimentally higher level of stress than do nonprocrastinators.

Interaction of Gender and Procrastination. A significant and unexpected two-way interaction between gender and the status of procrastination on stress scores also emerged from the analysis of variance. Males and females do not vary significantly in their overall change in increase of stress, with scores of 9.80, with a standard deviation of 8.01, and 7.63, with a standard deviation of 6.94 respectively, $F(1, 72) = 2.91$ $p = .10$. However, under conditions of distraction, males report an average increase in stress scores of 15.75 points, with a standard deviation of 6.23. Females, on the other hand, report an increase of only 10.95 points, with a standard deviation of 7.00. This interaction is significant, $F(1,72) = 4.23$, $p < .05$.

A Tukey honestly significant difference test (Hays, 1963) indicates these mean increases between distracted males and distracted females are not significant at the .05 level or less, $HSD = 4.04$. Likewise differences between nondistracted males and females are not significant. Thus, the unexpected interaction between gender and procrastination does not produce significant differences of mean increases in distraction scores between groups of distracted and nondistracted males and females.

Interaction of Distraction and Procrastination. A two-way interaction between distraction and the status of procrastination also emerged. Nonprocrastinating individuals in the distracted condition show the largest increase in the stress questionnaire score, with a mean of 15.15 and a standard deviation of 7.77. Procrastinators in the distraction condition show an increase of 11.55, with a standard deviation of 5.77. Nonprocrastinators in the nondistraction condition show the lowest mean increase in scores, with a mean of 3.15, and a standard deviation of 4.76. Procrastinators in the nondistraction condition show a mean increase of 5.00, with a standard deviation of 4.48. The analysis of variance shows that these group differences are significant, $F(1,72) = 3.13$, $p < .05$.

A Tukey honestly significant difference test (Hays, 1963) indicates that procrastinators in the distraction condition and nonprocrastinators in the distraction condition differ significantly from procrastinators and nonprocrastinators in the nondistracted condition at the .05 level or less, $HSD = 4.13$. However, differences between procrastinators and nonprocrastinators within the condition of distraction are not significant for either group. These results fail to indicate that distraction has a different effect of distraction on procrastinators and nonprocrastinators.

The two-way interaction between gender and procrastination is not significant, $F(1, 72) = .58$, $p < .50$. Nor is the three way interaction between gender, distraction and procrastination significant, $F(1, 72) = .065$, $p < .50$.

In summary, the analysis of variance shows that the introduced manipulation of distraction has a significant effect on subject's subjective level of distress, as measured by two subscales from Cattell's Eight State Anxiety Questionnaire. Gender and status as a procrastinator alone have no effect on these scores. Although significant interactions emerged between gender and procrastination, and distraction and procrastination, significant within group differences were not found between mean questionnaire scores for procrastinating or nonprocrastinating females and males, or distracted and nondistracted males and females.

The next hypothesis stated that distracted procrastinators would underestimate a brief passage of time, compared with nondistracted procrastinators. Unfortunately, these hypotheses proved impossible to test with the experimental procedures implemented. Subjects were asked to give a verbal estimate of how much time they believed had elapsed. Over half of the subjects responded with an inexact phrase, such as the following: "about five or ten minutes", or "maybe seven or eight minutes". In all, 42 subjects, 25 procrastinators and 17 nonprocrastinators responded with a verbally inexact phrase, despite instructions to be as accurate as possible in their estimates. When asked to be more specific, 11 procrastinators and three nonprocrastinators stated that they could not do so. Two subjects, both procrastinating males, became visibly angry at the request to be more specific! Because of difficulties, this hypothesis remains untested.

Post Hoc Analysis of Subject Inexactness. The categorical nature of the tendency of some subjects not to be specific is amenable to a post hoc analysis, to determine whether this tendency was significantly more present in procrastinators. A chi-square test with Yates correction (Hays, 1963) was performed on the relationship between failing to respond with an exact time specification and the status of being a procrastinator. The results indicate that although this result approaches significance, it falls slightly short, $\chi^2 = 3.04$, $p < .10$.

A similar chi-square with Yates correction for two degrees of freedom (Hays, 1963) was performed to ascertain if the tendency of students to refuse to specify time exactly following being corrected for failing to do so once was significantly associated with procrastination. The results of this analysis also indicate an insignificant relationship,

$\chi^2 = .96$, $p < .35$. Thus, the tendency to refuse to answer the time estimation request exactly, either after having been asked to do so once or even twice, cannot be said to be statistically associated with procrastination.

Estimation of Time the Reading Task

Hypothesis VIII stated that procrastinators would estimate less time to complete a reading task than nonprocrastinators. Hypothesis IX predicted that distracted procrastinators would estimate less time to complete a reading task than nondistracted procrastinators.

Group Differences in Speed of Completion of Reading Task. Prior to the testing of this hypothesis a post hoc analysis is necessary to ascertain whether procrastinators actually did take less time to complete the reading task. Table 6 shows the actual time for completion of the reading task for procrastinators and nonprocrastinators by gender and condition of distraction.

A 2 (procrastination) X 2 (distraction) X 2 (gender) analysis of variance was performed on the data. None of the results or interactions were significant. This indicates that for the task of performing the experimental reading passage, neither the status of procrastination, gender, nor being under the distracting condition effect the actual time needed for reading completion.

Effects of Procrastination on Reading Time Estimation. Table 7 shows the raw time estimates for reading task completion for procrastinators and nonprocrastinators, broken down by conditions of distraction and gender. A 2 (procrastination) X 2 (distraction) x 2 (gender) analysis of variance was performed on these time estimates. The results of the three way analysis of variance show a significant main effect for the independent variable of procrastination, $F(1,72) = 20.89, p < .001$. Procrastinators have a mean raw time estimate of 179.80 seconds, with a standard deviation of 43.19 seconds. Nonprocrastinators have a mean raw time estimate of 217.90 seconds, with a standard deviation of 35.43 seconds. This is evidence for hypothesis VIII that procrastinators tend to underestimate time necessary to complete a task.

Table 6

Time Needed for Reading Task Completion

Group	<u>Time Needed (in Seconds)</u>	
	Mean	SD
Total Population	192.35	23.98
Procrastinators	192.35	23.90
Distracted Subjects	191.25	30.14
Males	191.90	14.81
Females	190.60	41.21
Nondistracted Subjects	193.45	16.40
Males	186.60	17.85
Female	200.30	12.03
Nonprocrastinators	195.75	25.19
Distracted Subjects	197.95	31.10
Males	190.70	12.54
Females	205.20	42.05
Nondistracted Subjects	193.55	18.03
Males	187.40	20.98
Females	205.20	42.05
Gender (total)		
Males	188.65	15.96
Females	198.95	30.00
Distraction (total)		
Distracted Subjects	194.60	30.42
Nondistracted subjects	193.00	16.26

Effects of Distraction on Reading Time Estimation. The main effect of distraction is significant, $F(1, 72) = 1.62, p < .25$. Distracted subjects have a mean raw time estimate of 204.12 seconds, with a standard deviation of 54.19 seconds. Undistracted subjects have a mean raw time estimate of 193.57 seconds, with a standard deviation of 28.20 seconds. This suggests that the condition of being distracted does not significantly alter estimation of time necessary to complete a task.

Interaction of Procrastination and Distraction. Hypothesis IX predicted an interaction between procrastination and distraction. This interaction was not supported by the data, $F(1, 72) = .67, p < .45$. The mean raw time estimation for procrastinators in the distraction condition is 181.65 seconds with a standard deviation of 55.58 seconds. For procrastinators in the nondistraction condition, the number is actually less, 177.95, with a standard deviation of 23.54. These findings do not support the belief that procrastinators tend to increase their underestimates of time necessary to complete a task when they are under conditions of distraction.

Interaction of Procrastination and Gender. Two unexpected interaction effects emerged from the analysis of variance. A two-way interaction between procrastination and gender is significant, $F(1, 72) = 4.63, p < .05$. The mean raw time estimates for males and females are approximately the same across conditions. For males, this figure is 200.52, with with a standard deviation of 42.40. For females, this esti-

Table 7

Time Estimation for Reading Task Completion

<u>Mean Reading Time Estimation (in Seconds)</u>		
Group	Mean	SD
Total Population	198.85	43.19
Procrastinators	179.80	42.17
Distracted Condition	181.85	55.58
Males	206.00	65.01
Females	157.30	31.27
Nondistracted Subjects	177.95	23.54
Males	174.90	29.91
Females	181.00	15.95
Nonprocrastinators	217.15	35.21
Distracted Subjects	225.10	43.22
Males	221.20	30.01
Females	229.00	54.83
Nondistracted Subjects	209.20	23.30
Males	197.00	18.28
Females	221.40	21.95
By Gender (total)		
Males	199.77	41.89
Females	197.17	44.44
By Distraction (total)		
Distracted Subjects	203.37	53.84
Nondistracted Subjects	193.57	28.02

mate is 197.17, with a standard deviation of 44.44 seconds. Procrastinating males have a mean raw time estimate of 190.52, with a standard deviation of 51.77 seconds, while procrastinating females have a mean raw time estimate of 169.15 seconds, with a standard deviation of 27.05 seconds. Similarly, nonprocrastinating males have a mean raw time estimation of 210.60 seconds, with a standard deviation of 28.22 seconds. Nonprocrastinating females have a time estimation of 225.20 seconds, with a standard deviation of 40.85 seconds.

A Tukey honestly significant difference test failed to find significant differences between the mean time estimates of procrastinating males and females at the .05 level or less, HSD = 26.97. Nor were significant differences found between mean time estimates of nonprocrastinating males and females. Significant differences were found between female procrastinators and female nonprocrastinators, but also between male procrastinators and female nonprocrastinators. No significant differences were found between male procrastinators and nonprocrastinators. Therefore it can be stated that females were the most effected by their status as procrastinators. Figure 1 shows the results of this interaction.

Interaction of Distraction and Gender. A second interaction emerged from this analysis. The two way interaction between distraction and gender is significant, $F(1,72) = 4.97$, $p < .05$. Distracted males have a mean raw time estimation of 215.10 seconds, with a standard deviation of 50.52 seconds. Nondistracted males have a time estimate of

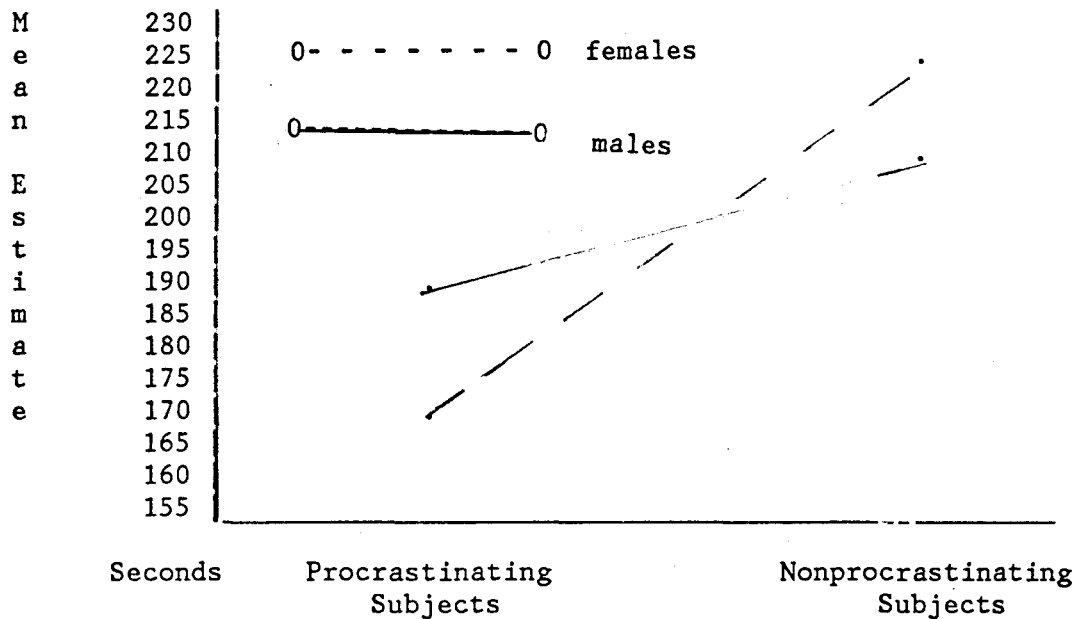


Figure 1: Interaction of Procrastination and Gender for mean estimation times in seconds.

185.95 seconds, with a standard deviation of 26.66. Females tend to fall within these two ranges, despite the experimental condition of distraction, with a mean raw time estimate of 193.15 in the distraction condition, with a standard deviation of 56.93, and a raw time estimate of 201.20, with a standard deviation of 27.89 in the nondistraction condition. A Tukey honestly significant difference test failed to find significant differences at the .05 level between any of these mean values, HSD =17.14. Therefore, although the interaction between distraction and gender is significant, mean differences between time estimates for groups of distracted males and females and nondistracted males and females are not significant. Figure 2 illustrates the result of this interaction.

Procrastination and Accuracy of Time Estimation

Hypothesis X stated that procrastinators will be less accurate in their estimation of actual time necessary to complete a task. To test this hypothesis, estimated times for completion of tasks were correlated for each subject with his or her actual time for completion.

Table 8 shows the correlation of time estimation and actual reading time for procrastinators and nonprocrastinators. Although procrastinators' estimates correlated less with their time needs than nonprocrastinators, a Fischer's \underline{r} to \underline{Z} transformation and subsequent two-tailed \underline{t} test (Hays, 1963) indicates that this observed increase in accuracy for procrastinators is not significant, \underline{t} (39) = 1.94, $p < .15$. Thus, the hypothesis that nonprocrastinators would be more accurate in their estimation of time necessary to complete a task is not supported.

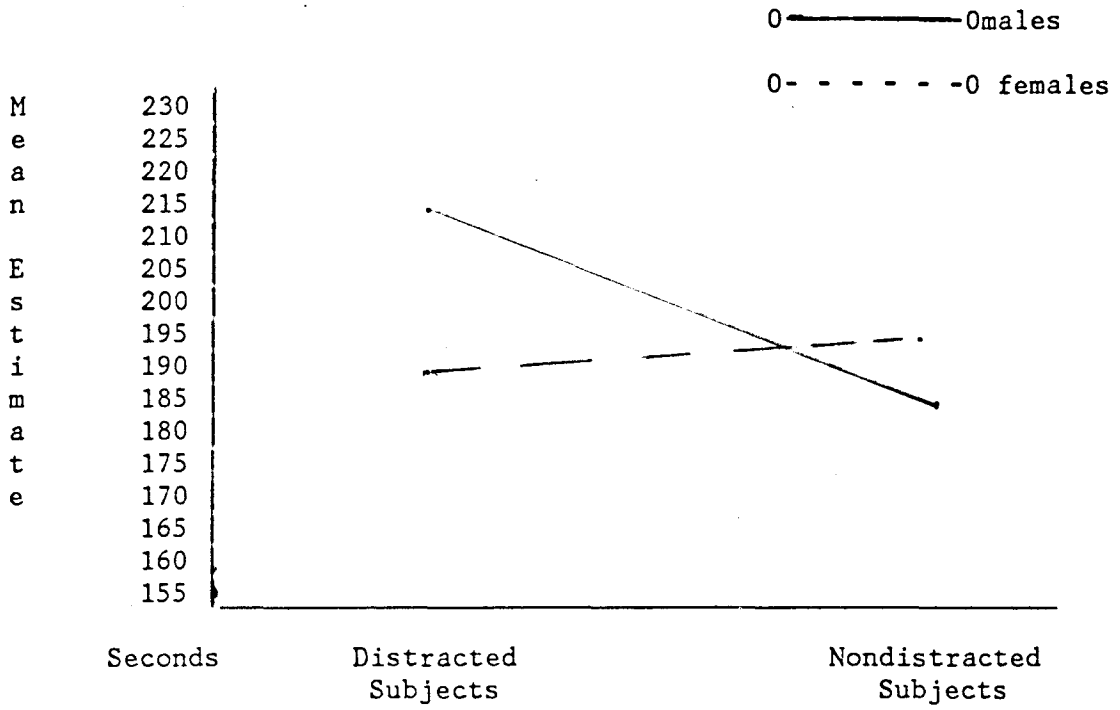


Figure 2: Interaction of Distraction and Gender

Table 8

Correlation of Estimation and Actual Reading Time

Group	Correlation of Time Needed with Actual Time	Significance of Correlation p
Procrastinators	-.04	.40
Nonprocrastinators	.38	.10

Clock Time Estimation

Clock Time Estimation and Procrastination. Hypothesis XI and XII concerned procrastination and estimation of clock time elapsed during the experimental session. Hypothesis XI stated that procrastinators would tend to underestimate the clock time time compared with nonprocrastinators. To test this hypothesis, clock time estimates for each subject were standardized into an equivalent measure, as specified by Orme (1971). Experimental sessions were conducted at half-hour intervals, beginning approximately either on the hour, or at half past the hour. Standardization was accomplished by simply subtracting thirty minutes from estimates made during the session started on the half-hour. and dropping the hour estimate for each subject. For example, if a student participating at 12:30 estimated the clock time at the end of the experiment as being 12:50, his/her clock estimation was recorded as 20 minutes.

The mean clock time estimates for procrastinators and nonprocrastinators across the experimental conditions of distraction, and by gender are shown in Table 9. The mean time estimation for procrastinators is 14.27 minutes with a standard deviation of 1.47 minutes. For nonprocrastinators, this figure is 14.95 minutes, with a standard deviation of .62 minutes. The analysis of variance shows that these differences are significant $F(1, 72) = 9.28, p < .01$.

Table 9

Clock Time Estimations Across Groups

<u>Mean Clock Time Estimation (in Minutes)</u>		
Group	Mean	SD
Total Population	14.61	1.18
Procrastinators	14.27	1.48
Distracted Condition	13.75	1.76
Males	14.76	.79
Females	12.75	1.92
Nondistracted Condition	14.79	.91
Males	14.99	.90
Females	14.59	.91
Nonprocrastinators	14.95	.62
Distracted Condition	15.01	.48
Males	15.08	.59
Females	15.94	.36
Nondistracted Condition	14.89	.75
Males	15.01	.58
Females	14.78	.91

Group Differences in Total Experiment Time. The data analysis presented above can be seen as providing support for hypothesis XI. However, it fails to take into account the post hoc analysis of actually how long subjects' real clock estimates were. If there are no significant differences between groups in time of experimental completion, this covariance is unnecessary (Winer, 1971). Table 10 shows the mean time of total experiment completion for procrastinators and nonprocrastinators by gender and condition of distraction.

A 2 (procrastination) X 2 (gender) x 2 (distraction) analysis of variance was performed to determine whether these differences are significant. The main effect of procrastination is significant, $F(1, 72) = 5.29$, $p < .05$. Procrastinators took less time to complete the total experiment.

Another unexpected finding is that females took less time to complete the experiment than men. For males, the mean experimental completion time is 15.26 minutes, with a standard deviation of 1.88 minutes. For females, the mean experimental time is 13.35 minutes, with a standard deviation of 2.92 minutes. An analysis of variance indicates that these differences are highly significant, $F(1,72) = 10.52$, $p < .001$.

Interestingly, the presence of the distracting stimulus seems to have no main effect on the time of completion of the experiment. Subjects in the distracted condition took 14.41 minutes to complete the experiment, with a standard deviation of 2.59 minutes. Subjects in the

Table 10

Total Experiment Time

<u>Total Mean Experimental Time (in Minutes)</u>		
Group	Mean	SD
Total Population	14.40	2.59
Procrastinators	14.41	2.59
Distracted Condition	13.01	3.44
Males	14.90	1.71
Females	11.12	3.76
Nondistracted Subjects	14.62	2.76
Males	15.60	2.24
Females	13.65	2.99
Nonprocrastinators	15.00	1.64
Distracted Subjects	15.18	1.47
Males	15.38	1.42
Females	14.99	1.57
Nondistracted Subjects	14.81	1.81
Males	15.16	2.25
Females	14.47	1.26
By Gender (total)		
Males	14.26	1.88
Females	13.55	2.92
By Distraction		
Distracted Subjects	14.09	2.59
Nondistracted Subjects	14.72	2.31

nondistracted condition took slightly longer, 14.72 minutes, with a standard deviation of 2.31 minutes. An analysis of variance indicates that these differences are not significant, $F(1, 72) = 1.43, p < .25$. An unexpected two-way interaction affecting the total time necessary to complete the experiment was also discovered. Procrastination and gender had a significant interaction, $F(1, 72) = 5.14, p < .05$. As a group, procrastinators have a mean experiment completion time of 13.82 minutes, with a standard deviation of 3.19 minutes. Procrastinating males have a mean experimental completion time of 15.25 minutes, with a standard deviation of 1.97 minutes. Procrastinating females have a mean time of 12.38 minutes, with a standard deviation of 3.55 minutes. Nonprocrastinating males have a mean experimental completion time of 15.27 minutes, with a standard deviation of 1.83 minutes. Nonprocrastinating females have a mean time of 14.73, with a standard deviation of 1.41 minutes. A Tukey honestly significant difference test indicates that the mean for the group of procrastinating females is significantly less than the mean for all other groups at the .05 level or less, $HSD = 1.65$. Procrastinating males, nonprocrastinating males, and nonprocrastinating females do not differ significantly from each other. Thus, it appears that females are the most affected by their status as procrastinators. Figure 3 illustrates the result of this interaction.

These results suggest that any conclusions based on this portion of the experiment take into account the fact the length of time subjects took to complete the experiment. When the differences between clock

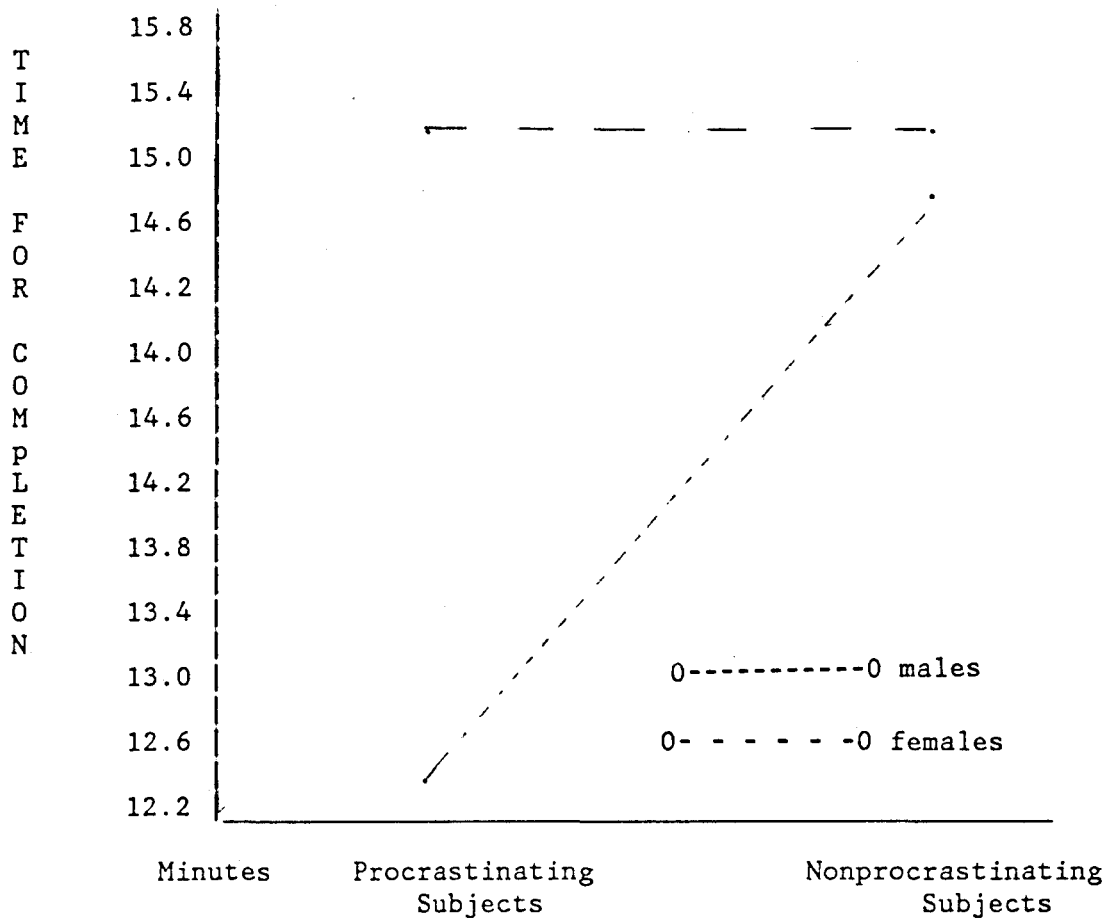


Figure 3: Interaction of Distraction and Gender

estimates for procrastinators and nonprocrastinators are covaried by the actual time each subject took in the experiment, the main effect of procrastination is not significant, $F(1, 71) = 2.39, p < .10$. The hypothesized interaction between procrastination and distraction is also not significant, $F(1, 71) = 2.15, p < .10$. Taking into account the unexpected variation in the time to complete the experimental task due to gender, procrastination, and interaction effects, hypothesis XII, stating that procrastinators will demonstrate a tendency to estimate less time elapsed during an experimental session is not supported. Nor is the interaction hypothesized in hypothesis XIII supported by the data if the covariance is statistically corrected.

Procrastination and Task Complexity

Hypothesis XIV stated that procrastinators would begin a task by undertaking a portion labelled simpler, compared to nonprocrastinators. Hypothesis XV predicted that procrastinators under conditions of distraction will choose simpler portions of the task than procrastinators not under the condition of distraction. Table 11 shows the mean values and standard deviations of the level of the initial choices of anagrams for procrastinators and nonprocrastinators across conditions of distraction, and genders.

A 2 (procrastination) X 2 (distraction) X 2 (gender) analysis was performed on subject choices of initial anagrams. A main effect is found for procrastination, $F(1,72) = 26.78, p < .01$. The mean level of choice of difficulty of anagrams for procrastinators is 1.95, with a

Table 11

Level of Complexity of Initial Anagram Choice

<u>Mean Level of Complexity of Initial Anagram Choice</u>		
Group	Mean	SD
Total Population	3.55	3.25
By Procrastination		
Procrastinators	1.95	2.61
Distracted Condition	1.20	1.70
Males	1.60	1.90
Females	.80	1.47
Nondistracted Subjects	2.70	3.15
Males	2.00	2.82
Females	3.40	3.43
Nonprocrastinators	5.15	3.05
Distracted Subjects	4.35	2.39
Males	5.10	2.33
Females	3.60	2.31
Nondistracted Subjects	5.95	3.47
Males	5.40	3.98
Females	6.50	2.99
By Gender (total)		
Males	3.52	3.26
Females	3.58	3.27
By Distraction		
Distracted Subjects	2.77	2.60
Nondistracted Subjects	4.33	3.66

High scores indicate a higher level of complexity of initial anagram choice.

standard deviation of 2.61 This is approximately the third easiest anagram. For nonprocrastinators, the mean level of difficulty is 5.15, with a standard deviation of 3.05, or approximately the middle portion of difficulty.


Under conditions of distraction, subjects also tended to choose simpler anagrams to begin solving. A main effect is found for the condition of distraction, $F(1,72) = 26.78$, $p < .05$. This suggests that individuals who are distracted tend to choose simpler anagrams to solve whether or not they are procrastinators. For distracted subjects, the mean level of anagram choice is 2.75, with a standard deviation of 2.59. For nondistracted subjects, the mean level of first choice was 4.32, with a standard deviation of 3.66.

Hypothesis XV predicted a two-way interaction between procrastination and distraction. This interaction is not significant, $F(1, 72) = .007$, $p < .93$. This indicates that although both procrastinators and distracted individuals have a tendency to begin a task by choosing simpler portions, distracted procrastinators do not show this tendency any more than nondistracted procrastinators.

In conclusion, although a number of hypotheses were supported, a larger number were not. Evidence was found for the hypothesis that students scoring in the highest quartile of Aitken's Procrastination Inventory would report studying less than students scoring low. Students categorized by the questionnaire as procrastinators also reported taking less classes than nonprocrastinators. The hypothesis that pro-

crastinators were more extraverted than nonprocrastinators was supported by the findings. Procrastinators also had a tendency to underestimate the time necessary to complete an academic task. Finally, the hypothesis that procrastinators would begin an assignment by performing the easier portions of the required task was also supported.

A number of unexpected difficulties in experimental procedure made the testing of all hypotheses advanced in Chapter Two impossible. Moreover, a number of hypotheses were not supported. These include those attempting to account for variances in the procrastination inventory by environmental factors. These also include hypotheses regarding the interaction of distraction and procrastination, and the comparative ability of procrastinators and nonprocrastinators to estimate the real clock time.



CHAPTER V

DISCUSSION

The present study represents the first experimental investigation of some hypothesized behaviors of college student procrastinators. This study sought to link the ill-understood behavior of procrastinators to two fundamental concepts of experimental psychology, time estimation, (Fraisse, 1963) and task complexity (Woodworth, 1938). Furthermore, it attempted to relate procrastination with one of the more most well-researched traits in the individual differences literature, that of extraversion (Broadbent, 1981). This study also attempted to further validate the trait notion of procrastination by attempting to rule out more parsimonious explanations for the behavior by establishing their inadequacy. That so much could be undertaken in a brief experimental project indicates how little is known about the behavior of procrastinators. Consequently, a number of the results of this study are worthy of comment.

Criterion Validation of the Procrastination Questionnaire

To date, Aitken's (1982) measure represents the only questionnaire designed to discriminate chronic academic procrastinators from punctual students. Aitken's measure, however, has been used only twice, both times by the author herself in her pilot study of personality correlates associated with procrastination.

The necessity for cross-validation of a questionnaire purporting to assess a personality variable is well recognized in the literature (Cook & Campbell, 1979; Lanyon & Goodstein, 1982). Unfortunately, as Cattell (1983) notes, cross-validating studies are rare in personality research. One reason, Cattell states, is that personality research is frequently conducted by lone researchers, without time or resources to cross-validate a newly defined construct. Another reason, Cattell notes candidly, is that there is more prestige associated with constructing a questionnaire of one's own, rather than conducting research with someone else's. Thus, frequently, the somewhat unglamorous work of what Kuhn (1962) has labelled as "normal science", the testing and refining of preexisting constructs of other scientists, is frequently ignored in personality research. One of the goals of this study was to attempt such "unglamorous" cross-validation of Aitken's questionnaire.

This study supported Aitken's finding (1982) that her measure can predict the amount of hours students claim to spend studying. Naturally, this is encouraging for anyone who wishes to use the Aitken measure for research concerning procrastination. As Taylor (1979) has noted, one of the factors delaying the advancement of knowledge concerning procrastination has been the lack of a suitable instrument to discriminate chronic procrastinators from others. The cross-validation provided by this study can be taken as preliminary evidence that such a measure, Aitken's Procrastination Inventory, presently exists.

The scope of the cross-validation attempted by this study was however, is limited. Specifically, Aitken's questionnaire predicted students' self-reports concerning average weekly study time. The study did not attempt to predict future studying behavior, only the self-reports about such behaviors. As self-reports have been criticized as frequently correlating only moderately with actual behavior (Cattell, 1973), future research interested in additional cross-validation of Aitken's measure would probably wish to predict future behavior, rather than simply the report of the behavior.

A second area of limitation can be raised regarding the external validity of this study. External validity concerns whether the findings in one study will generalize to other populations (Cook & Campbell, 1979). Two problems with this study warrant attention regarding the ability to generalize these findings to other student populations.

A first concern is that the mean number of hours reported studying by students per week in this experiment (24.17) seems intuitively quite high. It is notable that there is a rather large standard deviation associated with this figure for both procrastinators (15.96), and non-procrastinators (13.85), suggesting a large amount of within-group variance. A portion of this variance could be due to the fact that self-reports concerning study-hours were taken for each subject at the time the Aitken Procrastination Inventory was administered. Since the questionnaire was administered throughout the semester, some students were reporting their hours during exam periods. Whether this would inflate

between group differences of procrastinators and nonprocrastinators is unknown.

Secondly, the typicality of the sample from Loyola University, compared with students from other university populations, is questionable. No data was collected on the frequency of students in the sample whose native language is not English. However, admissions data from Loyola indicates that approximately 30% of entering students in the 1984 freshman class come from homes where English is not the primary language (Loyola University, 1985).

It is not hard to see that Aitken's Procrastination Inventory could overrepresent foreign students as nonprocrastinators. As O'Malley (1963) has indicated, an initial behavior of most new immigrants to the United States attempting to assimilate to their new culture is an effort to gain the respect of their host culture by being overscrupulous about the newly learned social norms. An examination of the Aitken measure suggests the possibility that many of the items measuring procrastination are likely to be answered in a fashion typical of nonprocrastinators by the overconscientious or overscrupulous newly immigrated student. These include such items as those asking about returning library books, being early for appointments, paying bills before due date, arriving to class before it is necessary, and even laying ones' clothes out the night before appointments.

Furthermore, it can be hypothesized that these immigrant individuals would appear to be on the low end of the distribution of the "trait"

of procrastination, as measured by Aitken's questionnaire. Language-based differences in the studying behavior of these students might be responsible for the self-reported differences in mean times of studying by individuals scoring low and high on Aitken's Procrastination Inventory. Students whose native language was not English would probably have to put more hours into studying. Consequently the difference in self-reported hours studying between these students and native speakers would make the Aitken Procrastination Questionnaire appear to be validated.

This problem with the external validity of the attempted cross-validation of Aitken's Procrastination Questionnaire can best be answered by replications of the cross-validation with diverse populations (Cook & Campbell, 1979). Until then, claims that the Aitken Procrastination Questionnaire has been cross-validated should probably be of a modest nature.

Procrastination and Extraversion

It was hypothesized that procrastinators would show significantly higher extraversion scores than nonprocrastinators. This hypothesis was based on two lines of reasoning. By definition, extraverts are more sociable, and consequently would be at higher risk for being diverted from school work. Secondly, extraverts show greater adverse psychological effects from repetitive tasks than introverts, and consequently seek much more increased and diverse stimulations than their less outgoing peers (Eysenck, 1967).

Evidence that social distraction causes procrastination is furnished by Taylor (1979), in his pilot study of alternative behaviors students engage in when they are procrastinating. He found that the most frequent activity leading up to incidences of school work procrastination in college students was "spending too much time with friends". Presumably, extraverts, since they are more "people-oriented" would succumb to this pressure more often than introverts.

On the other hand, Taylor found that unplanned social interaction accounted for only 12% of total incidences of delays in school work. What is apparent from his study is that people engage in a multitude of activities when they are procrastinating, ranging from listening to music, to spending too much time on portions of class assignments that do not justify the effort. On the basis of Eysenck's theory (1984) this variety of behaviors is not surprising. Extraverts engage in a spectrum of behaviors more often, but for less time, than introverts. This need for diversity of stimulation appears to contribute to some of the apparent differences between procrastinators and nonprocrastinators.

One limitation of the present study must be noted. Determination of the amount of actual variance in procrastination scores accounted for by the factor of extraversion was impossible to test with the procedure employed. Individuals studied were those in the highest and lowest quadrants of the procrastination scale. Any attempt to statistically parcel out the effects of extraversion on procrastination would be covarying scores that are not normally distributed. This would produce a spurious

estimation of covariance (Winer, 1971). Future researchers might wish to more thoroughly examine the impact that extraversion has on procrastination scores across an entire population. Data analyzed for these two variables across the entire population could furnish the desired estimation of the amount of variance in procrastination scores accounted for by the personality trait of extraversion.

Future researchers should not limit their study to the utilization of a single scale of a particular personality inventory, as was done in the present study. Instruments such as the Eysenck Personality Questionnaire furnish information on a number of orthogonal personality variables which might be relevant for the understanding of procrastination. A cluster analysis attempting to associate specific characteristics with extremes on Aitken's scale could hypothetically discover different types of procrastinators, each with differing personality styles. Such a finding might be of use in clarifying etiological issues associated with individual subtypes of procrastination. Perhaps a typological approach to procrastination would also assist the clinician in constructing more effective treatment strategies, based on the personality dynamics of the procrastinator.

Procrastination and Environmental Factors

This study sought to determine whether two likely variables, commuting time and hours of employment per week, influenced procrastination scores. It was hypothesized that procrastination is related to two situational constraints operating to deprive the individual of usable free time.

These hypotheses were not supported by the data. Procrastination scores were not significantly related to the amount of commuting time, nor to the number of hours a student spent working outside of school. This seems to argue against the parsimonious notion that procrastination is simply a function of excessive demands on an individual's time resources.

Convergent and Divergent Validity of the Procrastination

The findings of this study that procrastination cannot be accounted for by simpler constructs would seem to establish additional criterion validity for Aitken's measure. In this case, the criterion of hours studying is predicted by scores on the measure. Since Aitken's questionnaire has not been cross-validated with criteria other than from her original study, the finding that procrastination scores are related to the total hours individuals report studying is an important contribution to the validity of this relatively new questionnaire.

From the perspective of Cook and Campbell (1979), the findings presented so far can be seen as important in establishing another type of validity, namely that of construct validation for a trait of procrastination. Cook and Campbell argue that a newly introduced hypothetical trait can be legitimately argued to exist if validated both "convergently" and "divergently". If procrastination represents a relatively enduring cognitive style or personality trait, it should correlate or "converge" with behavioral evidence of hours spent studying. Similarly, it should "diverge" from data attempting to account for it by a more

parsimonious explanation, such as by environmental variables alone. This is exactly what was found in this study.

The process of establishing both convergent and divergent validity has been referred to by Cook and Campbell (1979) as establishing a "nomological net" for a hypothetical trait. A useful role for future studies would be to add to the "nomological net" for this trait by showing additional incidences of predictive validity that can be found using a trait concept of procrastination. For example, showing that scores on the inventory are relatively enduring over time would add to the "nomological net". A study correlating scores on Aitken's inventory with nonacademic procrastination would also be of importance in establishing that procrastination is a useful personality trait not accounted for by a more parsimonious explanation. Researchers could examine procrastination scores as they relate to when students register for class, file income taxes, pay bills, or apply for financial aid. The investigation of the numerous behaviors that a hypothetical trait of procrastination might impact on are limited only by the researchers' energy and creativity.

The above is not to indicate that some students who find themselves "time crunched" do not often misallocate usable hours, failing to optimize the best possible usage of their available time. Rather, the study suggests that Procrastination Inventory scores measure variance that cannot be attributable to the common-sense explanation that students postpone doing school work because they are busy commuting or employed outside of school.

This study is limited in that it only examined two variables that might constrain a student's available hours. Numerous other potentially time consuming variables exist that might restrict a student's study time. These could include family problems, a dating relationship, sleep needs, poor health, roommate problems, strong interests in hobbies, or many other potentially time-constraining situations that reduce the student's available study time. Future research would wish to examine many of these to see if separately, or together, they contributed to a significant portion of the variance observed in the Procrastination Inventory Scores.

The Distraction Manipulation

The distraction manipulation was instituted to test specific hypotheses regarding the relationship between distraction and procrastination. Although the literature recognizes that loud noises are the most effective in inducing distraction (Broadbent, 1957), it has also been found that noises varying in intensity and duration can have a significant disrupting effect (Teicher, Arees, & Reilly, 1963), mimicking that of louder noises, and of stressors in general (Broadbent, 1971). Changes from pre to post test scores of stress, measured by Cattell's Eight State Questionnaire (1978) indicate that subjects who received the audio distraction did indeed report more "cognitive disruption", a term Cattell (1973) uses to explain the tendency towards errors in information processing associated with distracting stressors.

Although the change in pre-test to post-test stress scores indicates that the distraction manipulation was successful in creating a degree of subjective aversiveness in the subjects, the ineffectiveness of the distraction manipulation in causing the subjects' significant disruption in their capacities to process information is illustrated by the absence of the main effect of distraction on some of the experimental tasks. Distraction had no effect on the length of time necessary to complete the reading passage, nor did it have any effect on the total experimental time. If the manipulation would have been thoroughly successful, it can be argued that the distraction would have increased times for both tasks, as was found by Teicher, Arees, and Reilly (1963) in their study of the effects of distraction on task performance.

Furthermore, it is not clear that the manipulation is in any significant way analogous to real life anxiety or stressors. Hearing bizarre sounds may be disquieting, but there is no literature equating it to the stresses encountered in real life. This seems to be particularly relevant to the type of stressors likely to be encountered in academic settings. These include such essentially cognitive demands as unmet deadlines, task ambiguity, and the subjective feeling of having too much to do. Future research might obtain the hypothesized interaction if it could ethically manipulate the cognitive stress subjects subjectively perceive, rather than just their degree of distraction by hearing aversive music.

Estimation of the Brief Time Interval

This research utilized three separate estimates of time. The first, a verbal estimate of how much time subjects thought had elapsed following a brief period, was unanalyzable. Many subjects had the tendency to be approximate in their estimates, not wanting to be "pinned down" to providing a single, inflexible answer. This was true despite experimental instructions to subjects to attempt to be as accurate as possible in their time estimation. Although procrastinators manifested this tendency more than nonprocrastinators, the results were not significant. Future research would do well not to allow subjects this much latitude in their capacity to respond. Instead, inexactness of subject responses should be restricted by requiring subjects to write down, rather than verbalize, time estimations.

Estimation of Time Needed for Reading Task Completion

The second estimate of time required subjects to state how long they thought a reading task would take them to complete. This was the lone time estimate that Aitken (1982) found to be different in procrastinators and nonprocrastinators. Procrastinators had a significant tendency to estimate less time to complete a reading passage than nonprocrastinators.

Here, as in Aitken's study, significant differences were found between procrastinators and nonprocrastinators. Procrastinators tended to estimate less time necessary to complete a task, while nonprocrastinators tended to estimate more time.

The interaction between gender and the estimation of reading time was complex and entirely unexpected. Males and females did not differ significantly from each other across aggregate conditions in their total time estimates for reading task completion. However, males were relatively unaffected by their status as a procrastinator in estimating their time requirements. Females, on the other hand, varied by almost 56 seconds in their estimates depending upon their status as a procrastinator. Procrastinating females tended to estimate the least time for completion of the reading task, while nonprocrastinating females estimated the most. These very interesting findings warrant future investigation.

Estimates of Real Clock Time

- not supported

This study hypothesized that procrastinators estimate less real clock time, compared with nonprocrastinators. The experimental procedure followed is described by Orme (1971). It involved subjects' naming the clock time, adjusting these estimates by the time subjects began the experiment, and then comparing subject estimations. With this procedure significant differences were found between groups. Procrastinators made real time estimates that were less than nonprocrastinators.

The assumption in Orme's methodology is that the experimenter controls the length of the experimental interval. This was not the case in this study, since subjects finished the experiment at their own pace. Consequently, an adjustment must be made for how long the experiment took each subject to complete. When this adjustment is made, the differ-

ences between procrastinators and nonprocrastinators in clock time estimation are not significant. Thus, the experimental hypothesis that procrastinators would tend to underestimate the clock time was not supported.

It was further hypothesized that time underestimation of procrastinators would increase under conditions of distraction. No significant interaction between procrastination and distraction was found. Therefore, there was no support for the experimental hypothesis.

Effects of Procrastination on Time of Task Completion

One of the more puzzling findings of this experiment is that procrastinators took less time to complete the total experiment than nonprocrastinators. For the experimental reading task there were no significant group differences in time needed to complete the passage. However, for the time to complete the entire experimental session, quite pronounced group differences were evident. Procrastinators took less time to complete the experimental session than nonprocrastinators. These results are, again, totally unexpected, and quite puzzling. This is especially true since no differences were found between groups on length of time necessary to complete the reading passage.

One explanation is that a superior ability to complete academic work quickly, or perhaps some general cognitive efficiency factor, encourages an attitude of procrastination. Students who perform academic tasks more quickly learn that it is within their ability to put off most of these tasks until the last minute. They eventually get them done.

Consequently, such students develop a cognitive style continually tempting the "academic faits". As long as this strategy works for them, they will continue to follow it. Students who tend to take longer to complete a task, for whatever reason, probably learn to allocate more time than is necessary. Consequently, if any contingency situations arise, students who have allocated more time are in a superior position to handle the unexpected demands.

An alternative explanation for why procrastinators were quicker in their time is that they simply have more practice working quickly. Since they routinely wait until the last minute, they have developed a finely honed capacity of working quickly. In this case, their task speed would be the result of a consistent history of procrastination, rather than the cause.

The reading task, on the other hand, is more circumscribed in its time flexibility. Reading speeds are relatively difficult to boost, apart from special techniques resembling skimming (see Whimbey, 1975, for a discussion of this point). The "bottom line" for how long it takes the procrastinator to complete the reading task is his or her reading speed, a figure with a rather narrow standard deviation, fairly consistent in most college students. It is therefore unlikely that differences in reading speeds will occur between procrastinators and non-procrastinators. However, procrastinators may have learned ways to "cut corners" during other portions of the experimental task. For example, they may have spent less time on the reading questionnaire portion

of the experiment, or on the anagram task. In this manner, although they would show no significant differences from nonprocrastinators in their time to complete the reading passage, their time to complete the total experiment would be less. The accuracy of this explanation is a question for future studies to consider.

Gender and Time of Task Completion

Significant gender differences were also found regarding the length of time necessary to complete the experiment. Not only did procrastinators take less time to complete the experiment, but so did women. Furthermore, a significant interaction effect between time of completion of task and gender emerged. Males stayed approximately the same in their actual experimental completion time, regardless of their status as a procrastinator. Females, on the other hand were significantly influenced by their status as a procrastinator, Procrastinating females had the shortest experimental time. Nonprocrastinating females had a time that approximated the male average.

One possible explanation for these gender differences is that the females felt anxious or stressed by the male experimenter and sought to speed up their performance. On the other hand, females could have been attempting to work rapidly to impress the male experimenter. Such explanations, however, are pure speculation. Clearly, more research is necessary regarding the interaction of gender and procrastination on time of task completion.

*Procrastinators
to complete*

This study was probably relatively insensitive to individual differences in clock time estimation. The total experimental time across groups coincidentally approximated fifteen minutes. Since experiments were scheduled at half hour intervals, the sessions generally ended at approximately 15 minutes after the hour or 15 minutes to the hour. At the same time, there was a tendency of many subjects to conveniently round off their clock estimates to a fifteen minute interval. Eighteen procrastinators (45% of the procrastination population) and 15 nonprocrastinators (37.5% of the population) stated that the clock time was at a 15 minute clock interval, either 15 after the hour, or 15 before the hour, depending on when the experiment started. (A binomial test of proportions reveals that these differences are not significant, $p < .40$).

Almost half of the subjects apparently "assumed" that the experiment would end at a fifteen minutes interval. The tendency of individuals to estimate clock time by such "round" intervals has been noted in the literature (Orme, 1971). Many people have a tendency to approximate the real time in fairly large intervals, usually those that are multiples of five (Orme, 1971). Orme notes that while such estimates are usually adequate for daily functioning, they are sufficiently ingrained that it frequently becomes difficult to obtain more accurate time estimates in the laboratory. Unfortunately, the close proximity of the actual experiment time to a fifteen minute interval made the experimental procedure somewhat insensitive to potential individual differences.

Future research would do well to schedule time estimation tasks at varying intervals so that the tendency of subjects to approximate their estimation with a "round" figure does not tend to minimize individual differences that otherwise might be evident.

Additionally, the surprising absence of a main effect for distraction on the total time necessary for experimental completion suggests that the distraction manipulation was not successful. Broadbent (1971) indicates that one of the effects of distracting noise is to slow down task speed and to disrupt concentration. That the subjectively unpleasant noises individuals were experiencing in the distraction condition failed to have a discernible effect on the length of time to finish the experiment suggests that the manipulation was not particularly successful, despite the self-reports of the Cattell measure. Orme (1969) has summarized the literature on time estimation and manipulated stress. His conclusion is that time estimations in laboratory tasks is frequently altered by a stress intervention. Perhaps with a more stressful distractor, one more analogous to anxiety-inducing variables associated with undone class assignments and upcoming exams, this interaction effect would have been significant. This would seem to be a valid area for future researchers to consider.

The puzzling effects of gender and the status of procrastination on time of task completion deserve further investigation. One approach would be to attempt to replicate these findings across a variety of tasks, academic and nonacademic, pleasant and dysphoric. A second area

of interest would be to see whether the gender of the experimenter influences these findings.

Procrastination and Cognitive Complexity

The final set of hypotheses tested stated that procrastinators would show a tendency to choose the cognitively simpler portion of a task, as compared to nonprocrastinators. It was further hypothesized that this tendency would increase under conditions of distraction. Only the first hypothesis was supported by the data. The anticipated interaction was not found.

However, a very strong main effect was found for both procrastination and distraction. Perhaps this can be best viewed from the perspective of comparisons. Procrastinators show a significant tendency to attack the simpler portions of a problem first. Nonprocrastinators don't show this tendency as much, unless they are distracted, in which case they behave in a similar manner to procrastinators.

This finding seems to provide evidence for both a trait and a task component of procrastination. Chronic procrastinators maintain a particular coping style that is emulated by nonprocrastinators when they are distracted. The analogues of this finding are well known; long neglected dorm rooms get a thorough cleaning the week before a stressful final. Simple questions on exams get answered first and more thoroughly, possibly at the expense of a balanced optimal performance. Graduate students uncertain of their research ability or future direction spend excessive time on the literature review of their dissertation or thesis, to the exclusion of actually collecting data.

The above finding appears to provide at least some evidence for Silver's hypothesis (1974) that procrastination is a function of the specifics of the task at hand. As Silver notes, stressful situations have a tendency to cause individuals to overdo what they feel they can do well. During this experiment, this phenomenon was illustrated by the fact that both procrastinators and individuals under the distraction condition (which, from the Cattell (1978) Eight state questionnaire can be seen as stressful) showed the tendency to attack the easier portions of a set of problems before attempting the more difficult parts.

However, we must add a psychological addendum to Silver's structural theory of procrastination as a function of task stress. Individual differences play a major portion in this tendency. Some students, the procrastinators, had a head start towards this direction, tending to begin at the simplest portion of a task regardless of the level of external distraction. Others individuals, the nonprocrastinators, show a task completion strategy resembling procrastinators only when they are experiencing external distraction.

Silver's theory (1974) states that procrastination is a function of task complexity. Task pleasantness is never addressed by his theory, although Silver's examples refer only to completion of unpleasant tasks. It is unclear whether the findings that procrastinators begin a task by performing the simpler portions could generalize to other tasks that are perhaps more pleasant, yet still complex. Do procrastinators avoid reading books for pleasure? Do they prefer less complex themes in movies

and plays? Indeed, do they procrastinate on tasks that are pleasant at all? The experimental task included in this study did not distinguish between these two variables of complexity and unpleasantness. Because of this difficulty, its findings should be interpreted with caution.

Directions for Future Research

Regardless, one of the strongest findings in this study is that there is a relationship between level of difficulty of task choice and procrastination. This relationship should certainly be teased out by future research. The above-mentioned distinction between pleasant and unpleasant tasks suggests that both task structure and task pleasantness could be experimentally manipulated to attempt to determine the relative importance of both in causing procrastination.

Other tasks besides anagram solving should be employed in future research. Although the experimenter was attempting to manipulate only the level of difficulty of the anagram task, doing so implicitly manipulated the subjects' expectancy of being able to solve the task successfully. It is possible that the tendency of some subjects to solve the easiest anagrams first was actually a function of insecurity about ability, fear of being evaluated, or even need for immediate task feedback. All of these hypothetical variables could be the real cause of the observed differences, rather than the "trait" of procrastination. Future research could manipulate the subjects' success or failure at previous experimental tasks to see whether this has the same effect on anagram choices as the "trait" of procrastination. The present data does

not rule out that procrastination, as measured by the Aitken Inventory (1982), is simply a measure of one or more pre-existing constructs. Manipulating success and failure of procrastinators and nonprocrastinators to determine whether the main effect found in this study is still obtained would seem to be an important next step for laboratory-based procrastination research.

Towards a Cognitive Model of Procrastination

The implicit orientation of most of the previous research on procrastination, including this study, has been that procrastination can best be studied from a trait perspective. Specifically, the strategies of most researchers has been to afford procrastination the status of one of two types of traits, a surface, or a source trait. Cattell (1980), an advocate of trait approaches to human behavior, has defined the differences between these two levels of typology. A surface trait is semi-permanent behavioral cluster, hypothesized to be caused by combinations of more fundamental, independent, and more immutable constructs, labelled as source traits. Such reducible traits as leadership, kindness, happiness, and impetuosity are surface traits, while extraversion, emotional lability, intelligence and reaction time are source traits.

The methods of procrastination researchers utilizing this personality-based inquiry of procrastination has been uniform. Taylor (1979), Briordy (1980), Green (1981), Aitken (1982), and several of the studies in the PSI literature have attempted to delineate source traits contributing to a major portion of the variance observed between procrastina-

tors and nonprocrastinators. To do this, each operationally defined procrastination, and then administered a battery of personality tests. As Aitken (1982) notes rather morosely, no correlations found so far have accounted for more than 12% of the total variance between procrastinators and more punctual students. This leads her to believe that procrastination is a relatively irreducible construct, unaccountable for by any known personality variables. She admits that this affords the variable of procrastination the same status as that of intelligence. Simply put, for Aitken, procrastinators behave the way they do because they "have" the trait of procrastination.

This disappointing search for the combination of source traits that will "explain" procrastination suggests that perhaps another avenue of inquiry than simply that of declaring procrastination an irreducible construct is warranted. In recent years, psychology has generally moved away from the a trait-based explanation of human behavior (Mischel 1968). Researchers have found it more heuristic to emphasize cognitive processes rather than either source or surface traits. Rather than postulate mediating and explanatory constructs, the increasing emphasis in psychology is to directly examine the cognitive contents associated with the behavior of interest.

A cognitively-based explanation can avoid the trap to which personality based explanations have often succumbed. As Cattell notes, personality theorists have frequently allowed a mere typology of behavior to serve as a sufficient explanation (Cattell, 1980). Many psychol-

ogists have been content to construct a trait, and then, use the same trait for an explanation about why particular behaviors exist. Aitken (1982) illustrates this tendency when she states that the reason behavioral differences exist between individuals on extreme portions of her scale is that those on one end of the continuum possess a trait that others do not.

The advantage of cognitive explanations of procrastination is that it avoids explaining the behavior by labelling it. A cognitive explanation of procrastination seeks to find cognitions occurring prior to the behavior observed. In this manner, it seeks a truly causal explanation, rather than a taxonomic or associational account (Popper, 1959).

Despite the philosophical advantages associated with avoiding a trait explanation of behavior (Mischel, 1968), previous studies have found little to support the notion that procrastination is related to cognitive processes. Aitken (1982) failed to find evidence supporting Ellis and Knaus' (1977) assertions that procrastination is related to perfectionism. Aitken also found only moderate support for Ellis and Knaus' belief that procrastination was related to excessive anxiety. The study by Taylor (1979) failed to show a strong correlation between locus of control and procrastination. Indeed, it was difficult to make the claim that procrastination was related to any cognitive processes.

The present study suggests that the role of cognitions in the process of procrastination be further examined. One of the strongest findings in this study is that procrastinators show a preference for begin-

ning an academic task with the simplest portion. This suggests a re-examination of the role that performance "styles" and generalized task strategies play in the role of developing the consistent habit of procrastination. This promising finding would seem to justify future research placing greater emphasis on the explanatory role of thought in accounting for the behavior of procrastinators.

Viewing procrastination as a cognitive style, rather than as a fixed trait, reorients procrastination research from the cul-de-sac of the previous studies. The heuristic value of this redirection is evident in the many hypotheses immediately generated by such unshackling. For example, one of the more fruitful areas of inquiry might be the self-statements procrastinators generate when facing an unpleasant task. Following the completion of this study, two studies examining precisely these variables have been reported in the literature. Powers (1985) found that the cognitive variable of locus of control can account for a larger portion of the behavior of procrastinators than Taylor (1979) found, providing the notion of "triggering cues" is included. Powers found that locus of control regarding procrastinated tasks is not a stable concept, but varies depending on certain cognitions associated with the task at hand. An individual with a generally internal locus of control might face a temporary, and debilitating shift towards an external locus of control on the basis of irrational cognitions associated with a particular task. The result of this shift is to cause an incident of procrastination in the otherwise competent individual. Powers' study is

exciting in that it seeks to demonstrate how fairly stable traits can temporarily be influenced by cognitive self-statements. Certainly, more research in this direction is necessary.

Another exciting development in the cognitive-behavioral analysis of procrastination was published following the completion of this study. Greco (1985) developed a self-statement inventory of cognitions associated with procrastination. This inventory was designed to be used both as an assessment tool, and as a treatment strategy. Procrastinating individuals in treatment begin by monitoring their self-statements regarding completion of specific tasks that have caused them difficulty in the past. Once clients become aware of the pattern of cognitions associated with procrastination, the future detection of these cognitions serves as impetus for monitoring undesirable behavioral correlates frequently found to follow these thoughts.

This type of checklist naturally lends itself to use with in vivo longitudinal studies of cognitions associated with procrastination. Students could be studied across an entire semester for their cognitive-self statements concerning managing time necessary for task completion. Changes in self-statements as a function of impending examinations or deadlines could be assessed. The role that stress plays in changing students self-statements concerning academic tasks could be studied. Differences between self-statements in students known to score high and low on a trait inventory of procrastination could be compared. Finally, workable treatment strategies could be tested developed based upon the

longitudinal monitoring of students' self-statements regarding completion of their schoolwork.

Conclusion

Researchers interested in procrastination cannot help but be groundbreakers. Considering that academic procrastination is a frequently cited problem of college students, the lack of research into this area is surprising. This study has attempted to demonstrate that using available measures, procrastinators can be differentiated from nonprocrastinators, and can be studied in laboratory situations.

This study has been successful in pinpointing a potential relationship between procrastination and time estimation. It has also provided added validation for the only tool available to distinguish procrastinators from nonprocrastinating peers. While it argues that at least some of the tendency towards procrastination is related to extraversion, it failed to account for procrastination as a function of extraneous time variables unrelated to more pervasive personality traits.

One of this study's strong findings is that procrastination is related to the tendency to choose simpler portions of a task for a starting point. This is a finding with an immediate treatment implication; procrastinators should be urged to tackle more difficult assignments first. In this way any unexpected delays will have minimal impact upon their scheduling of work completion.

Certainly, this study has raised more questions than it has answered. But this situation of "knowledgeable obfuscation" is to be

expected in any early scientific investigation. The philosopher of science Karl Popper (1959) has characterized the initial stages of any scientific inquiry as being with a "bucket, and not a searchlight". By this, he means that until enough initial data is obtained about the phenomena being investigated, even the most intelligent theories will fail to provide a reasonable explanation of the concept being studied. Enough has to be known about a phenomena to justify the use of a "searchlight". Prior to this, science must procede in a Baconian fashion, gathering data to eventually be explained by theory. Even then, Popper argues, most early hypothesis testing is more likely to be of value in the questions that it raises, rather than in the answers it provides.

The buckets from previous studies of procrastination seems sufficiently full to begin to advance theoretical explanations for the whys of procrastination. This study has been among the first to attempt to utilize the searchlight of theory to make testable hypotheses reagrding the behaviors of chronic academic procrastinators. Naturally, the light will be shined in many directions before the phenomenon is sufficiently illuminated. Unsupported hypotheses and novel findings are also important, for they serve to rule out or expand our very small knowledge base. At this stage of our understanding, the questions being raised by this study are, perhaps, as important as the answers being provided.

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APPENDIX A

THE AITKEN PROCRASTINATION INVENTORY

1. I delay starting things until the last possible minute (true).
2. I'm careful to return library books on time (false).
3. Even when I know a job needs to be done, I never want to start it right away (true).
4. I keep my assignments up to date by doing my work regularly from day to day (false).
5. If there were a workshop offered that would help me learn not to put off starting my work, I would go (true).
6. I am often late for my appointments and meetings (true).
7. I use the vacant hours between classes to get started on my evening's work (false).
8. I delay starting things so long I don't get them done by the deadline (true).
10. I am often frantically rushing to meet deadlines (true).
11. It often takes me a long time to get started on something (true).
12. I don't delay when I know I really need to get the job done (false).
13. If I had an important project to do, I'd get started on it as

quickly as possible (false).

14. When I have a test scheduled soon, I often find myself working on other jobs when a deadline is near (true).
15. I often finish my work before it is due (false).
16. I get right to work at jobs that need to be done (false).
17. If I have an important appointment, I make sure the clothes I want to wear are ready the day before (false).
18. I arrive at appointments with plenty of time to spare (false).
19. I generally arrive on time to class (false).

Scoring for items marked true:

- | | |
|---|---------------------------|
| 5 | a=true |
| 4 | b=mostly true |
| 3 | c=cannot say [?] |
| 2 | d=mostly false |
| 1 | e=false |

Scoring reverses for items marked false.

Procrastination score is sum of all items. Higher scores are associated with procrastination.

APPENDIX B

THE EYSENCK EXTRAVERSION QUESTIONNAIRE

Items loading the highest for the trait of extraversion in a composite university sample (from Eysenck & Eysenck, 1979).

1. I'd rather study with a group of people than be by myself (true).
2. I generally prefer reading to meeting people (false).
3. I don't usually enjoy big crowds with lots of people (false).
4. I am generally outgoing and talkative (true).
5. I usually make my mind up quickly (true).
6. I like planning things well in advance (false).
7. I often do things on the spur of the moment (true).
8. I usually plan carefully before doing anything (false).
9. My friends consider me reserved (false).
10. Having lots of different friends is important to me (true).
11. I don't enjoy loud parties (false).
12. I can talk with most anyone if I am in the mood to do so (true).

Scoring: One point for each response in the keyed direction.

APPENDIX C

TIME USE QUESTIONNAIRE

DIRECTIONS: This questionnaire examines the ways in which college students use their time.

The following scale should be used to answer questions 1 through 56.

a=TRUE
b=MOSTLY TRUE
c=CANNOT SAY
d=MOSTLY FALSE
e=FALSE

1. I have an accurate sense of time even without looking at the clock.
2. I delay starting things until the last possible minute.
3. I'm careful to return library books on time.
4. I enjoy the courses I am now taking at Loyola.
5. I often don't finish tasks on time.
6. I believe I will get good grades this semester.
7. It doesn't bother me when I put off beginning my work, because I can get the job done when I have to.
8. I usually meet my own self-set deadlines.
9. I get anxious when I have school work that is undone.
10. I'd rather study with a group of people than by myself.
11. Even when I know that a job needs to be done, I never want to start it right away.
12. I often act without thinking.
13. I am most efficient and do my best work when I wait until the last minute to do projects.
14. I keep my assignments up to date by doing my work regularly from day to day.

PLEASE GO ON TO THE NEXT PAGE

TIME USE QUESTIONNAIRE

a=TRUE
b=MOSTLY TRUE
c=CANNOT SAY
d=MOSTLY FALSE
e=FALSE

15. I generally prefer reading to meeting people.
16. I feel guilty when I delay starting school assignments.
17. I have a pretty good idea what I want to do in life.
18. I get more anxious at the last minute than most people.
19. I find myself daydreaming quite often.
20. If I have a number of jobs that need to be done by the end of the day, I usually get them done.
21. If there were a workshop offered that would help me learn not to put off starting my work, I would go.
22. I enjoy parties with lots of people.
23. I don't seem to know when I need to start a job in order to get it done on time.
24. I have a hard time concentrating on whatever I'm doing.
25. I am generally satisfied with my grades.
26. I feel my classes are important for my future career.
27. I am often late for appointments and meetings.
28. I use the vacant hours between classes to get started on my evening's work.
29. I feel anxious when I should be working on a job but I am not working on it.
30. I delay starting things so long I don't get them done by the deadline.
31. I am generally outgoing and talkative.

PLEASE GO ON TO THE NEXT PAGE

TIME USE QUESTIONNAIRE

a=TRUE
b=MOSTLY TRUE
c=CANNOT SAY
d=MOSTLY FALSE
e=FALSE

32. I am often frantically rushing to meet deadlines.
33. I overestimate the amount of work that I can do in a given amount of time.
34. I like planning things well in advance.
35. I usually make up my mind quickly.
36. It often takes me a long time to get started on something.
37. I often do things on the spur of the moment.
38. I don't delay when I know I really need to get the job done.
39. If I had an important project to do, I get started on it as quickly as possible.
40. I enjoy working under the pressure of finishing jobs, even when the deadline is near.
41. Good grades in my courses are very important to my future plans.
42. When I have a test scheduled soon, I often find myself working on other jobs when a deadline is near.
43. I don't daydream very often.
44. I often finish my work before it is due.
45. I have difficulty applying myself to work requiring long concentration.
46. I believe that careful planning takes the fun out of life.
47. I get right to work at jobs that need to be done.

PLEASE GO ON TO THE NEXT PAGE

TIME USE QUESTIONNAIRE

a=TRUE
b=MOSTLY TRUE
c=CANNOT SAY
d=MOSTLY FALSE
e=FALSE

48. I could get as good grades at Loyola as I wanted to if I put forth the effort.
49. I make decisions easily and quickly.
50. I have a good idea what I want to do when I get out of school.
51. If I have an important appointment, I make sure the clothes I want to wear are ready the day before.
52. I usually think carefully before doing anything.
53. I arrive at appointments with plenty of time to spare.
54. I probably daydream more than most people.
55. I generally arrive on time to class.
56. I am often late leaving my house/dorm in the morning.

PLEASE GO ON TO THE NEXT PAGE

TIME USE QUESTIONNAIRE

DIRECTIONS: For questions 57-60 please choose your answers and mark them carefully on the answer sheet.

57. In general, I estimate that I procrastinate(begin putting off my work) with the following frequency:
- a. seldom
 - b. occasionally
 - c. half the time
 - d. frequently
 - e. usually
58. During the current academic year I have turned in the following number of late term papers (four pages or more):
- a. none
 - b. one
 - c. two
 - d. three
 - e. four or more
59. For the fall semester of this year I took the following number of incomplete grades in my classes.
- a. none
 - b. one
 - c. two
 - d. three
 - e. four or more
60. For the fall semester, I had to stay up four or more hours past my usual bedtime to study or finish a paper
- a. no times
 - b. once or twice
 - c. three to five times
 - d. six to ten times
 - e. more than ten times

PLEASE GO ON TO THE NEXT PAGE

TIME USE QUESTIONNAIRE

DIRECTIONS: For questions 61 to 64, please write your answers in the space on the answer sheet.

61. How many hours a week do you study on the average?
62. How long does it take you to get to campus each day?
63. How many hours are you employed (for pay) per week?
64. How many hours a week are you in classes (including lab classes)?

THANK YOU VERY MUCH

Thank you very much for participation in the survey. About one-quarter of students being surveyed will be asked to return for a second experimental session (For an additional credit).

Unless you indicate otherwise, it will be assumed that you are willing to be included in a second experimental session.

Check here if you are NOT willing to participate further.

Thank you very much. If you are selected to participate in the second portion of the experiment you will be notified by phone within one week. Additionally, your social security number will be posted by the entrance to the psychology department.

APPENDIX D

CATTELL EIGHT STATE QUESTIONNAIRE: FIRST ADMINISTRATION

PLEASE PUT THE LETTER OF THE ANSWER THAT BEST APPLIES TO YOU

ON THE ANSWER SHEET

1. Right now, there is (positive)
 - a. a great deal of pressure on me.
 - b. some pressure on me.
 - c. hardly any pressure on me.
 - d. no pressure on me.

2. I am doing as well as I really can (negative).
 - a. very true
 - b. fairly true
 - c. fairly false
 - d. very false

3. Right now, circumstances won't allow me to take it easy (positive).
 - a. very true
 - b. fairly true
 - c. fairly false
 - d. very false

4. Right now, I am (negative)
 - a. very calm.
 - b. somewhat calm.
 - c. somewhat restless and on edge.
 - d. very restless and on edge.

5. At the moment, I am not feeling any great stress or strain.

(negative)

- a. very true
- b. fairly true
- c. fairly false
- d. very false

6. At the moment, I am feeling I can work to the best of my abilities.

(negative)

- a. very true
- b. fairly true
- c. fairly false
- d. very false

7. At the moment, I am feeling I can concentrate as usual.

(negative).

- a. very true
- b. fairly true
- c. fairly false
- d. very false

8. Right now, I am relaxed and able to work efficiently.

(negative).

- a. very true
- b. fairly true
- c. fairly false
- d. very false

9. At the moment, I am finding it hard to think (positive).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
10. Right now, I feel distracted by what's going on around me.
(positive).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
11. Right now, there's not enough stress on me to bother my
ability to think clearly (negative).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
12. Right now, I feel I can block out any distractions from
bothering how I think (negative).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false

13. I feel I can solve problems as well as I usually can (negative).

- a. very true
- b. fairly true
- c. fairly false
- d. very false

Scoring: Positive items

a=4

b=3

c=2

d=1

Negative items reverse scoring.

Total stress/distraction score is total number of points.

APPENDIX E

CATTELL EIGHT STATE QUESTIONNAIRE: SECOND ADMINISTRATION

1. During the experiment there was (positive)
 - a. a great deal of pressure on me.
 - b. some pressure on me.
 - c. hardly any pressure on me.
 - d. no pressure on me.

2. During this experiment. I did as well as I could have (negative).
 - a. very true
 - b. fairly true
 - c. fairly false
 - d. very false

3. During the experiment circumstances wouldn 't allow me to take it easy (positive).
 - a. very true
 - b. fairly true
 - c. fairly false
 - d. very false

4. During the experiment I was (negative)
 - a. very calm.
 - b. somewhat calm.
 - c. somewhat restless and on edge.
 - d. very restless and on edge.

5. During the experiment I did not feel any great stress or strain.
(negative)
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
6. During the experiment I felt I could work to the best of my abilities (negative).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
7. During the experiment I felt I could concentrate as usual.
(negative).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
8. During this experiment I was able to concentrate and work efficiently (negative).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false

9. During the experiment I found it hard to think (positive).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
10. During the experiment I felt distracted by what was going on around me (positive).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
11. During the experiment there was not enough stress on me to bother my ability to think clearly (negative).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false
12. During the experiment I felt I could block out any distractions from bothering how I thought (negative).
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false

13. During the experiment, I felt I could solve problems as well as I usually could (negative)
- a. very true
 - b. fairly true
 - c. fairly false
 - d. very false

Scoring: Positive items

a=4

b=3

c=2

d=1 Negative items reverse scoring.

Total stress/distraction score is total number of points.

APPENDIX F

ANAGRAMS

Sample anagrams used for demonstration:

Word	Presentation
1. bat	(bta)
2. cat	(cta)
3. ball	(blla)

Anagrams used for first experimental task:

Word	Presentation	Median Solving Time As Reported by Mayzner and Tresselt
fling	ifnlg	2 seconds
judge	egujd	3 seconds
youth	oyhtu	18 seconds
fruit	iuftr	15 seconds
(unsolvable)	nrcul	----

Graded Anagrams Used for Part II

Word	Present- ation	Number of "difficulty" on card	Median Solving Time as Reported by Mayzner and Tresselt
ice	iec	0 - 0%	Not on list
voice	eocvi	1 -10%	4.0 seconds
house	euohs	2 -20%	6.0 seconds
brawl	awrlb	3 -30%	6.5 seconds
drink	nrdki	4 -40%	7.0 seconds
guide	ieugd	5 -50%	7.0 seconds
scrub	rbcsu	6 -60%	10.5 seconds
paint	iptna	7 -70%	13.0 seconds
pound	uodnp	8 -80%	17.0 seconds
music	iumcs	9 -90%	27.0 seconds

(Lists from Mayzner & Tresselt, 1962; 1965).

APPENDIX G

READING PASSAGE QUESTIONNAIRE

On a separate sheet of paper, please write the letter of the answer that is the most correct.

1. The author says that religion
 - a. is a relatively new phenomena.
 - b. was invented several thousand years ago.
 - c. is a universal phenomena.

2. The author believes that
 - a. religion is unimportant in America.
 - b. religion is very important in America.
 - c. religion is completely irrelevant to most Americans.

3. A safe assumption is that the author believes
 - a. religion will become less important in the future.
 - b. religion will continue to be important in the future.
 - c. religion will not matter in the future.

4. Religion in Russia
 - a. has been wiped out.
 - b. is about to be wiped out by the Communists.
 - c. is still strong despite the Communist Party's efforts.

The thesis submitted by William McCown has been read and approved by the following committee:

Dr. Patricia Rupert, Director
Associate Professor, Psychology, Loyola

Dr. Thomas Petzel
Professor, Psychology, Loyola

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

July 10, 1986
Date

Patricia Rupert
Director's Signature