COMPARISON OF SELF-MONITORING AND A COMBINATION OF SELF-MONITORING, SELF-REINFORCEMENT, AND SELF-PUNISHMENT OF STUDY TIME ON TEST PERFORMANCE

Dissertation for the Degree of Ph. D.

MICHIGAN STATE UNIVERSITY

CARMEL ANNE MYERS

1977

This is to certify that the

thesis entitled

COMPARISON OF SELF-MONITORING AND A COMBINATION OF SELF-MONITORING, SELF-REINFORCEMENT, AND SELF-PUNISHMENT OF STUDY TIME ON TEST PERFORMANCE

presented by

Carmel Anne Myers

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Department of Counseling, Personnel Services, and Educational Psychology

Walter G. Hapkiewicz
Major professor

Date 1-19-77

O-7639

COMPARISON
SELF-MONIT
PUNISHMEN

Two self

resent investig

onitoring plus

self-punishment

Different instr

itions for the

was operational

graphing of stu

reinforcement a

as positive and

The control gro

to the investi

Two in

were conducted

class with 149

The de

academic perfo

ABSTRACT

COMPARISON OF SELF-MONITORING AND A COMBINATION OF SELF-MONITORING, SELF-REINFORCEMENT, AND SELF-PUNISHMENT OF STUDY TIME ON TEST PERFORMANCE

By

Carmel Anne Myers

Two self-control procedures were compared in the present investigations--self-monitoring (SM) and self-monitoring plus a combination of self-reinforcement and self-punishment (SM+C). A control group was also included. Different instructions comprised the operational definitions for the self-control techniques. Self-monitoring was operationalized as the daily tallying, recording, and graphing of study time for a designated course. Self-reinforcement and self-punishment were operationalized as positive and negative self-ratings of study time. The control group was given was given a task irrelevant to the investigation.

Two independent replications of the experiment were conducted in a chemistry class and in a calculus class with 149 and 80 subjects respectively.

The dependent variable of primary interest was academic performance, operationally defined as the

score on the secon
independent variab
reported study ti
conditions (SM an
also provided rat
result of the pre
their condition.
istered to stude
in an effort to
instructions.

In chemi
first midterm ex
students in the
nificantly bett
However, in cal
obtained. Thus
Hypothesis 1, w
of students in
superior to co

Hypoth
self-monitor a
punishment in
dence superior
simply monitor
not supported

Hypoth
condition wou

score on the second midterm exam. As a result of the independent variable of self-monitoring, information on reported study time was available for the two experimental conditions (SM and SM+C). Students in the SM+C condition also provided ratings of their reported study time as a result of the presence of the independent variable for their condition. Finally, a questionnaire was administered to students in the two experimental conditions in an effort to assess the degree of conformity to instructions.

In chemistry, analysis of covariance, using the first midterm examination as a covariate, indicated that students in the experimental condition performed significantly better than students in the control group. However, in calculus, no significant difference was obtained. Thus, only partial support was obtained for Hypothesis 1, which predicted that the academic performance of students in the experimental conditions would be superior to controls.

Hypothesis 2 predicted that students assigned to self-monitor and administer self-reinforcement and self-punishment in the form of self-ratings (SM+C) would evidence superior performance relative to students who simply monitored study time (SM). This hypothesis was not supported in either class.

Hypothesis 3 predicted that students in the SM+C condition would evidence higher reported study times

than studen

not support

Rep

classes, ho

the conflic

with regard

dents' aver

40 minutes

week experi

study time

a day over

to differ c

Stu

ported this

their study

the fact th

in calculus

time, althc

Que

ferential c

classes or

differences

then, to di

It

level is an

use of self

than students in the SM condition. This hypothesis was not supported in either class.

Reported study time did differ between the two classes, however, providing a potential explanation for the conflicting results obtained from the two classes with regard to student test performance. Chemistry students' average study time increased from approximately 40 minutes a day to 2 1/2 hours a day during the three-week experimental period. Calculus students' reported study time increased from 17 minutes a day to 37 minutes a day over the experimental period. The classes appeared to differ considerably in difficulty level.

Study time ratings from the SM+C conditions supported this interpretation. Students in chemistry rated their study time as adequate only 26% of the time, despite the fact they studied a great deal. Conversely, students in calculus rated their study time positively 48% of the time, although their reported study times were much lower.

Questionnaire results gave no indication of differential conformity to instructions either between classes or between conditions within each class. The differences between the two classes cannot be attributed, then, to differences in following instructions.

It is suggested that course or task difficulty level is an important variable affecting the successful use of self-control techniques. Further investigation

of this factor

of significant

ditions gives

effects resul

punishment pr

son of covert

and tangible

further resea

of this factor is recommended. In addition, the absence of significant differences between the SM and SM+C conditions gives some support to the view that self-monitoring effects result from a covert symbolic self-reinforcement/punishment process. Recommendations for further comparison of covert and overt reinforcers as well as symbolic and tangible reinforcers are made. Other suggestions for further research are included.

COMPARISON OF

SELF-MONITO

PUNISHMENT

in partial

Department of

COMPARISON OF SELF-MONITORING AND A COMBINATION OF SELF-MONITORING, SELF-REINFORCEMENT, AND SELF-PUNISHMENT OF STUDY TIME ON TEST PERFORMANCE

By

Carmel Anne Myers

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Counseling, Personnel Services, and Educational Psychology

1977

This dissertation is dedicated to Gary,

my closest friend and my husband.

ACKNOWLEDGMENTS

As chairman of my doctoral committee, an advisor, and, a teacher, Dr. Walter Hapkiewicz has contributed to this dissertation in many ways. I am grateful for his contribution to my understanding of social learning theory and his sound advice about my overall academic program. Most specifically, his interest, supervision, and support have been essential to the successful completion of this dissertation.

Dr. William Schmidt's advice, direction, and assistance with the data analysis of this research have also been essential. Furthermore, his courses in statistics, both the content and his exacting standards, provided the foundation of my understanding of statistical analysis. His expertise, combined with his sincere interest in students, commitment to teaching, and sense of humor, made his courses an academic high point. I am grateful to have had the opportunity to work with him in class and on this dissertation.

Dr. Eldon Nonnamaker's membership on my doctoral committee has been very important to me. As a member of

his staff fro
many practica
His advice and
staff member a

Dr. Wi
ing and acade
touchstone for
he made clear
ideas and acti
of social lear
for the assumpt
ideas and viewp
most limited to
parameters. So
and is reflecte
possible to giv
bution.

his staff from 1966 to 1975, I had the opportunity for many practical learning experiences that are unparalleled. His advice and support have been valuable to me as a staff member and as a student.

Dr. William Brazill has provided a model of teaching and academic excellence that will always serve as a touchstone for me. In his courses on intellectual history he made clear the importance of the relationship between ideas and actions--a viewpoint that is a basic principle of social learning theory. I learned, as well, to look for the assumptions that provide the parameters for ideas and viewpoints and that our freedom of thought is most limited to the extent we remain unaware of these parameters. So much of his teaching pervades my thinking and is reflected in my dissertation that it is no longer possible to give complete acknowledgment to his contribution.

TABLE OF CONTENTS

Table

LIST OF TABLES

Figure

1. Reported
combin

LIST OF FIGURES

CHAPTER I

RATIONALE AND STATEMENT OF THE PROBLEM

Introduction

Self-control techniques, an outgrowth of behavior modification and social learning theory, have been utilized to obtain behavior changes in a variety of subjects and settings. Increased interest in these techniques is a recent phenomenon. The present investigation compared one technique, self-monitoring, with a combination of techniques, self-monitoring, self-reinforcement, and self-punishment. This investigation also compared these self-control techniques with a control group. Such comparisons were required for theoretical and practical reasons which will be discussed later. College student classroom test performance in a calculus and chemistry class was the dependent variable of primary interest in this examination of the effect of two different self-control techniques on academic performance. Prior to a detailed account of the present investigation, discussion will focus on the reasons for the current surge of interest in self-control techniques and a review of the relevant literature.

Fact

The me

attention in re

a leading soci

notion that be

usually misinte

mercy of situat

behavior as sol

punishments pre

they possess se

to exercise som

and actions" (1

behavior are im

minants, nor mu

automatic (Band

mechanistic met

through the int

(Bandura, 1974a

tance of though

> Realization
> lated way o
> prompted th
> modificatio
> people chan
> are rewarda
> to discover
> of their ac

Thus, the influe

behavior is medi

Factors Contributing to the Subordinate Position of Self-Control

The methods of self-control are receiving increased attention in research on human behavior. Albert Bandura, a leading social learning theorist, observes that "the notion that behavior is regulated by its consequences is usually misinterpreted to mean that actions are at the mercy of situational influences. Theories that explain behavior as solely the product of external rewards and punishments present a truncated image of people because they possess self-reactive capacities that enable them to exercise some control over their own feelings, thoughts, and actions" (1977, p. 129). External factors in human behavior are important but they are not the sole determinants, nor must they be immediate, nor are their effects automatic (Bandura, 1971, 1974a, 1977). "Contrary to the mechanistic metaphors, outcomes change behavior in humans through the intervening influence of human thought" (Bandura, 1974a, p. 859). Bandura discusses the importance of thought and awareness in human behavior change:

> Realization that reinforcement is an unarticulated way of designating appropriate conduct prompted the use of cognitive factors in the modification of behavior. Not surprisingly, people change more rapidly if told what behaviors are rewardable and punishable than if they have to discover it from observing the consequences of their actions. (1974a, p. 862)

Thus, the influence that external factors exert on human behavior is mediated by human thought and immediate

reinforcement

delayed conse

Clear

animal behavi

Why, then, ha

Bandura offers

> Until rece
> have been
> theorizing
> the strong
> with infra
> generally
> self-appro
> and chimpa
> selves on
> getting lo
> people typ
> standards
> rewarding
> on whether
> match, or
> (1971, p.

Bandura's poin

extremely impo

part, to our s

(1974) in his

laws of learni

for the fall--

ferences betwe

consider impor

ducted in labo

settings.

Both o

to place appro

reinforcement is less important when anticipation of delayed consequences is possible.

Clearly, human behavior is not as dependent as animal behavior on immediate external reinforcement. Why, then, has self-control received less attention? Bandura offers a partial explanation:

> Until recently, self-reinforcement phenomena have been virtually ignored in psychological theorizing and experimentation, perhaps due to the strong set established by studies conducted with infrahuman subjects. Unlike humans, who generally respond to their own behavior in self-approving or self-criticizing ways, rats and chimpanzees are disinclined to pat themselves on the back or berate themselves for getting lost in a cul-de-sac. By contrast, people typically set themselves certain standards of behavior and self-administer rewarding or punishing consequences depending on whether their performances fall short of, match, or exceed their self-prescribed demands. (1971, p. 249)

Bandura's point that we have missed or minimized an extremely important facet of human functioning due, in part, to our selection of subjects is echoed by McKeachie (1974) in his discussion of the decline and fall of the laws of learning. He argues that there are two reasons for the fall--a failure to take account of essential differences between humans and animals, and, a failure to consider important differences between experiments conducted in laboratory settings and behavior in natural settings.

Both of these problems arise from a failure to place appropriate limits on our ability to

generalize--ac

example, we ge

individual beh

of individuals

too willing to

definitions of

as a whole. We

as the self-adm

accurate respon

proceed to talk

whole works or

forcers are bot

"events may ope

responses, in c

under very spec

p. 231). Likew

from one partic

such as test pe

academic achiev

ability to gene

operational def

There a

contributed to

Behaviorism has

would involve m

B. F. Skinner h

generalize--across subjects and across settings. For example, we generalize from studies with children to all individual behavior, and from case studies to behavior of individuals in groups. Similarly, we have been all too willing to generalize from specific operational definitions of an independent variable to a construct as a whole. We will operationalize self-reinforcement as the self-administration of tokens contingent on accurate responding on a verbal learning task and then proceed to talk about whether self-reinforcement on the whole works or does not work. It is not news that reinforcers are both subject and situation specific and that "events may operate as reinforcers only for particular responses, in certain descriminative contexts, and/or under very special setting conditions" (Gewirtz, 1971, p. 231). Likewise, we are all too ready to generalize from one particular dependent variable or outcome measure such as test performance to a more global construct like academic achievement. Emphasis upon the limits of our ability to generalize across subjects, settings, and operational definitions is important.

There are theoretical reasons as well which have contributed to the predominance of external control. Behaviorism has traditionally avoided discussions which would involve mentalistic conceptions like "the self." B. F. Skinner has decreed that the self is simply "a

device for rep

of responses"

tions like the

have been rece

in the work of

modification a

A care

the 1950s, howe

conceptions hav

writes that the

as he would cor

the manipulatio

function" (195

in 1953 discuss

"controlled re

individual see

"self-controll

are self-reinf

control contin

later.

It is

discussion abo

theory is not

has not receiv

in part to the

animal studies

device for representing a functionally unified system of responses" (1953, p. 285). Such mentalistic conceptions like the self and mediational factors in learning have been receiving increasing attention, nonetheless, in the work of social learning theorists and behavior modification advocates.

A careful reading of Skinner's earlier work in the 1950s, however, demonstrates that such mentalistic conceptions have never been completely eliminated. He writes that the individual "controls himself precisely as he would control the behavior of anyone else--through the manipulation of variables of which behavior is a function" (1953, p. 228). It was Skinner, in fact, who in 1953 discussed self-control and coined the terms "controlled response" (CR), which is the response the individual seeks to modify through the effect of a "self-controlling response" (SCR), examples of which are self-reinforcement and self-punishment. The self-control contingency will be discussed in more detail later.

It is important to recognize that debate and discussion about self-control within operant learning theory is not a recent phenomenon. That self-control has not received more attention and investigation is due in part to the initial trend in learning theory toward animal studies, a willingness to generalize too quickly,

and a theoretical predisposition that resulted in an emphasis upon externally controlled contingencies to the disadvantage of the self-control paradigm.

A fourth factor in the de-emphasis placed on self-control investigation is due to the polarized discussions on freedom and determinism which have plagued behaviorists. Individuals are either free, in which case behaviorism is wrong, or they are not free, in which case behaviorism is evil for bringing up the subject. Many of us have been so busy with the art of disputation that we have left the systematic investigation of self-control for the philosophical harangue. It is hoped that this useless polemical behavior is over. Mendelsohn (1975) discusses nonautonomous man who is neither the completely free and undetermined individual nor the opposite.

> Non-autonomous man is able to construe events and persist in behavior not instrumental to obtaining rewards. Consequences control many behaviors and non-autonomous man participates in self-control by his arrangement of personal consequences. Therefore, non-autonomous free man participates with the environment to control his own behavior; and to the extent that it is possible for him to control the contingencies of his own behavior he is free to contribute to the direction of his future. This concept of individual freedom may be operationally understood by analyzing self-arranged contingencies in light of available reinforcers, the frequency of utilizing these arrangements for a given setting, and the number of different settings in which self-arranged contingencies are applied. As self-arranged contingencies for personal behavior are instituted with increased frequency, non-autonomous man's freedom is increased, and when this control is increasingly directed by the environment (whether due to

> decreased frequency of self-arranged contingencies or powerful environmental consequences precluding the operation of such arrangements), non-autonomous man is less free. (p. 117)

One of Skinner's purposes in Beyond Freedom and Dignity (1971) is to increase the general level of awareness of the controlling factors in our lives such that we may better exert counter-control. Similarly, such an awareness enables better self-control as well.

Both counter-control and self-control presume a reciprocal relationship between the individual and the controlling environment. Goldiamond (1965) describes this relationship clearly when he asserts that the previous conception that behavior is simply a function of the environment (B=fE) is incomplete. In addition the environment is also a function of behavior (E=fB). Bandura (1977) notes that the social learning view of the interaction between the environment and the behavior also includes the person in the process of reciprocal determinism.

> Behavior, personal factors, and environmental factors all operate as interlocking determinants of each other (B⇄P⇄E). The relative influences exerted by these interdependent factors differ in various settings and for different behaviors. There are times when environmental factors exercise powerful constraints on behavior and other times when personal factors are the overriding regulators of the course of environmental events. (1977, pp. 9-10)

The kind of b
affects and d
affects us.

Such
our facial ex
cational leve
reading select
These and many
circular affec
behavior, howe
great deal of
the responsibi
environment--b
in large part
individual is
the controlling
selected.

Davison
study in which
counter-control
of particular i
in a circumstan
opportunity for
tingencies for
boy learned to
father's. Seric

The kind of behaviors we as individuals emit seriously affects and determines the environment which in turn affects us.

Such environment-influencing behaviors include our facial expressions, tone of voice, appearance, educational level, major interests, friends, job decisions, reading selections, selection of housing, and so on. These and many other factors exert a reciprocal and circular affect upon us which in turn affects our behavior, however, such reciprocity has not received a great deal of emphasis in behaviorism. So, at bottom, the responsibility that Skinner has shifted to the environment--both the credit and the blame--returns, in large part and appropriately, to the individual. The individual is responsible for the choices made within the controlling environment he or she has, in part, selected.

Davison (1969) describes an interesting case study in which an 11-year-old boy learned to achieve counter-control through self-control. This example is of particular interest because it involves an individual in a circumstance (childhood) in which there is less opportunity for a high frequency of "self-arranged contingencies for personal behavior." Nonetheless, the boy learned to modify his own behavior and thereby his father's. Serious behavior problems existed in the

family including parental drunkenness and physical abuse. The boy had a history of only behaving when his father was angry and mean. This obviously reinforced the father for being in such a mood and limited the type of interaction the child had with the father. Self-control was achieved through an "imaginal aversive contingency."

> [The boy] created the conditions [in his imagination] under which obedient, nonrebellious behavior occurred--namely, an angry father about to explode if an infraction occurs. In this fashion, the control of the boy's own behavior was vested in himself, for he did not need to rely on the environment for setting the conditions which control the most adaptive behavior. (p. 327)

The notion of self-control through self-applied contingencies is difficult enough for some behaviorists, even those who will permit mediation. To add imagined consequences is going a bit far. Davison goes on to say, "Of course, it must be kept in mind that the stimulus situation being created here for the control of behavior is within the boy's mind (pardon the expression), that is, entails the generation of covert response-produced discriminative stimuli" (p. 327). (The latter are otherwise known as thoughts.)

The reticence to deal with issues like self and mind in behavioral psychology has historical factors--behaviorism grew out of an opposition to mentalistic, introspective techniques in psychology. However, if we take Skinner at his word and recognize that the

"individual controls himself precisely as he would control the behavior of anyone else" we must recognize that verbal control is an extremely important form of control between individuals. It is also an extremely important form of self-control. We must recognize that verbal control need not be overt when it is self-control simply because it is overt when it is a controlling factor between or among individuals.

We have yet another instance in which the kinds of investigations we have typically undertaken determine the kinds of investigations we may undertake and the types of questions we may ask. When we are investigating verbal control that is between individuals, it is appropriate that the emphasis be placed on overt verbalizations. When we turn to self-control, such an emphasis no longer makes sense, although for measurement purposes, some overt manifestation like self-report is probably essential.

Meichenbaum (1973) is one of the few investigators who has systematically examined the area of verbal self-control. He discusses the importance of internalization of vocal commands as an important step in the developmental continuum that progresses from adult external verbal control of the child, to the child's overt verbal self-control, to the child's covert verbal self-control. His efforts to teach self-control to impulsive,

hyperactive children by teaching them to talk to themselves have been successful. Both direct instruction and modeling were effective.

In a picture matching test, children were taught to make comments like "It's okay, just be careful. I should have looked more carefully. Follow the plan to check each one. Good, I'm going slowly" (Meichenbaum & Goodman, 1971, p. 121). The authors note several assumptions that are implicit in their work ". . . that symbolic activities obey the same psychological laws as do overt behaviors and that private speech is teachable. Thus, behavior modification techniques which have been used to modify overt behaviors may be applied to cognitive processes" (p. 125). Furthermore, they note that "the impulsive children were taught to use their private speech for orienting, organizing, regulating, and self-rewarding functions with the consequence of greater self-control" (p. 124). Thus, a fifth factor contributing to the predominance of external reinforcement paradigms has been the emphasis upon overt behavior despite the early recognition that private events are subject to the same rules as public events (Homme, 1965; Skinner, 1953).

To reiterate, investigations of self-control techniques have been few in number, until recently, for at least five interrelated reasons. One, the initial behavioristic investigations focused on animals and

laboratory settings. Our questions and conceptions were accordingly limited. Also, contributing to our limited conceptualization was a willingness to generalize too quickly. We generalized from external control to all control, from animal behavior to all behavior, from laboratory settings to all settings, from particular operational definitions to constructs as a whole. Thirdly, our theoretical predisposition toward external control limited our investigations. It resulted in part from the fact that behaviorism grew in reaction to internally oriented introspective psychology. A fourth deterrant to systematic self-control investigations has been the polarized discussion of freedom and determinism. Thinking behaviorists would do their best to avoid that quagmire and stay on the firm ground of clean, external, well-controlled laboratory investigations. Finally, a fifth factor has been the emphasis upon overt behavior. Bandura observes that "with growing evidence that cognition has causal influence on behavior, the arguments against the influence of internal determinants began to lose their force" (1977, p. 10).

Our emphasis on these factors would not provide a climate for the healthy growth of a field of investigation including covert private events like imagined consequences, self-instruction, self-evaluation, and so on. As Bandura has observed, "what we believe man

to be affects which aspects of human functioning we study most thoroughly and which we disregard. Premises thus delimit research and are, in turn, shaped by it" (1974a, p. 859). The importance of covert responses or private events and internal mediational processes is an essential contribution of social learning theory to the analysis of behavior and learning. More attention will be directed to theory in the next chapter.

It is important for those involved with self-control investigations to avoid making mistakes similar to those discussed. Over-generalization is a danger within the field of self-control as well. Behavior modification and self-control studies often use single subject designs; generalization to behavior of groups is thus not entirely justified. Likewise, generalization to other settings is hindered by the prevalence of investigations involving intense relationships such as that of the therapist and the client. The types of behaviors subjected to modification in a self-control paradigm are often limited, typically including overt behavioral problems like obesity, nail-biting, cigarette-smoking, and stuttering. The prevalence of investigations using a well-supervised setting such as an institution, elementary school, or a secondary school setting hampers extrapolation to less supervised environments. The ability to make generalizations is enhanced by having a

variety of investigations in a given area which are conducted with different subjects, in different settings, and with different operational definitions for the particular construct under investigation.

Self-Control and Academic Performance

Although relatively few studies have been reported on the effect of self-control techniques and academic performance, which is the subject of this investigation, there is a great deal of diversity in the investigations which have been undertaken. Table 1 outlines 31 such studies. The selected studies are summarized under five categories--the particular self-control technique(s) used, design and the independent variable(s), the subjects, the dependent variable(s), and the effects reported for self-control techniques. Two requirements were made of studies to be included in Table 1. First, the independent variable(s) used must include at least one of the following self-control techniques--self-monitoring, self-reinforcement, or self-punishment. Second, the dependent variable(s) assessed were limited to study time, test performance, grades, academic response rate, number of correct solutions, number of errors, study habits, or time-on-task which includes related measures of incompatible behaviors such as out-of-seat behavior, talking-out, or other generally disruptive behavior. These specific

Table 1

Studies of Self-Control and Academic Performance

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Ballard & Glynn, 1975	Self-monitoring Self-monitoring plus self-determined and self-administered reinforcement	1 group--multiple baseline across behaviors	14 3rd graders	1. # sentences 2. # action words 3. % describing words 4. time on task 5. external assesment of writing	yes- for all dependent variables under combination of self-monitoring plus self-reinforcement
Beneke & Harris, 1974	Combination of: self-monitoring self-reinforcement self-punishment stimulus control study skills instruction	3 group comparison-- 1. written instruction 2. group discussion 3. no treatment control	53 volunteer college students obtained during summer registration	1. grade point average	1. yes- for combination of techniques and both written and discussion formats 2. no- for combination of techniques note: all results questionable due to inadequate control group
Bristol & Sloane, 1974	Self-monitoring	3 group comparison-- 1. self-monitoring 2. self-monitoring plus contingency contracting with external reinforcement in ABAB design 3. control	36 college student volunteers from an introductory psychology class	1. test performance	1. no difference in the 3 groups for overall test performance 2. reanalysis of 6 students in contracting group who were below-average based on previous class test resulted in a finding that contingency contracting plus external reinforcement was significantly more effective in improving test performance, relative to controls and self-monitoring.

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Broden, Hall & Mitts, 1971	Self-monitoring	case study--modified ABAB, teacher praise added to second intervention	2 8th graders	1. Lisa--study time in class 2. Stu--talking out	1. yes 2. equivocal note: occasional external reinforce- in the form of counselor praise confounded with self-monitoring conditions
Drabman, Spitalnik, & O'Leary, 1973	Self-monitoring	1 group--modified ABAB with 8 phases including token external reinforcement, token external reinforcement for self-reinforcement matches, self-reinforcement plus praise for accuracy	8 9-10 year old boys with academic and emotional problems in an after school program	1. disruptive behavior 2. academic output	yes-desired effect obtained under external reinforcement and maintained under combination of self-reinforcement and occasional praise, for both dependent variables
Felixbrod & O'Leary, 1973	Self-determined reinforcement standard	3 group comparison-- 1. self-determined standards for reinforcement 2. externally determined standards for reinforcement (yoked) 3. no reinforcement control	24 2nd graders	1. # correct arithmetic solutions 2. rate of correct problem solution 3. percentage of problems solved correctly 4. time in task setting	1. yes-self-determined and externally determined were equally effective and more effective than controls 2. no difference among groups 3. no difference among groups 4. yes-both experimental groups were equally effective and more effective than controls

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Felixbrod & O'Leary, 1974	Self-determined reinforcement standard	3 group comparison-- 1. self-determined standards for reinforcement 2. externally	24 3rd graders	1. # correct arithmetic solutions 2. time at task	1. yes-for later experimental sessions; no difference between self- and externally determined groups 2. yes-self-determined

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Felixbrod & O'Leary, 1974	Self-determined reinforcement standard	3 group comparison-- 1. self-determined standards for reinforcement 2. externally determined standards for reinforcement 3. no reinforcement control two phases-- experimental and extinction	24 3rd graders	1. # correct arithmetic solutions 2. time at task	1. yes-for later experimental sessions; no difference between self- and externally determined groups 2. yes-self-determined and externally determined were more effective than control and also were equally effective during experimental phase no significant difference in extinction period. All groups reduced # correct solutions and time at task
Fink & Carnine, 1975	Self-monitoring	1 group-- ABAB with feedback as to correct score alternating with feedback plus graphing	10 1st graders	# arithmetic errors	yes-self-monitoring associated with reduced errors
Fox, 1966	Self-monitoring	case study-- self-monitoring plus contracted daily increase	graduate student volunteer	time studying French	inconclusive-for self-monitoring; significant increases for whole program
Glynn, 1970	Self-reinforcement	4 group comparison-- 1. externally determined token reinforcement 2. self-determined token reinforcement 3. chance-determined token reinforcement 4. no token reinforcement	128 9th grade girls	test performance	yes-externally-determined and self-determined reinforcement eventually effective and superior to chance and to control groups

Table 1 (cont.)

Author(s)	Self-control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Glynn & Thomas, 1974	Self-reinforcement	1 group--modified ABAB, alternating baseline with self-reinforcement and self-reinforcement plus cueing for	9 disruptive 2nd graders	time on task	Yes-for self-reinforcement plus cueing only

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Glynn & Thomas, 1974	Self-reinforcement	1 group-- modified ABAB, alternating baseline with self-reinforcement and self-reinforcement plus cueing for appropriate behavior	9 disruptive 2nd graders	time on task	yes-for self-reinforcement plus cueing only
Glynn, Thomas & Shee, 1973	Self-monitoring Self-reinforcement	1 group-- modified ABAB, baseline alternating with external class contingencies and with individual self-control contingencies	8 2nd graders observed out of class of 34	time on task	yes-self-control techniques maintained improved peformance obtained under external control
Gottman & McFall, 1972	Self-monitoring	2 group comparison 1. monitored participation 2. monitored participation instructions reversed and experimental conditions altered with baseline in a modified ABAB design	17 high school sophomores labeled potential dropouts	class participation	yes-self-monitoring resulted in increase in behavior being modified
Goldiamond, 1965	Self-monitoring	case study-- self-monitoring and review of notes, exams, and weekly discussions with experimenter	college student volunteer	1. study time 2. grades	inconclusive with regard to self-control technique due to use of combination of techniques and absence of baseline control periods, overall improvement in study time and grades reported

Table 1 (cont.)

Author(s)	Self Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Harris & Trujillo, 1975	Self-monitoring Self-reinforcement Stimulus control	3 group comparison-- 1. self-management with combination of techniques 2. group discus-	113 7th, 8th & 9th graders who were poor in reading	grade point average	yes- self management and group discussion more effective than controls

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Harris & Trujillo, 1975	Self-monitoring Self-reinforcement Stimulus control	3 group comparison-- 1. self-management with combination of techniques 2. group discussion of study habits 3. control	113 7th, 8th & 9th graders who were poor in reading	grade point average	yes- self management and group discussion more effective than controls
Jackson & Van Zoost, 1972	Self-reinforcement	4 group comparison 1. self-administered reinforcement 2. external reinforcement 3. no reinforcement 4. no treatment control	Exp. 1 47 college student volunteers for a study skills program Exp. 2 35 college student volunteers for a study skills program	1. grade point average 2. score on Survey of Study Habits and Attitudes (SSHA)	1. no differences obtained in either study 2. yes-Work Methods scale improved significantly for self-and externally administered reinforcement relative to no reinforcement and control, in Exp. 1 only note: results in question due to problem with conceptualization of no reinforcement
Jackson & Van Zoost, 1974	Self-reinforcement	2 group comparison-- 1. study skills program plus self-reinforcement of quality of teaching another the skill 2. study skills program	30 college student volunteers for a study skills course	1. study habits score on SSHA 2. score on Study Skills Inventory	equivocal-self-reinforcement of teaching associated with improved scores, however, appropriate control comparisons absent.
Johnson & White, 1971	Self-monitoring	3 group comparison 1. self-monitor study behavior 2. self-monitor dating behavior 3. no contact control	97 college student volunteers in an introductory psychology course	1. course grade as of 6th week of quarter 2. course grade as of 10th week and end of course	1. yes-self-monitoring study time significantly improved relative to self-monitoring dating behavior and no treatment control inconclusive-80% of class received final grade of A; variability reduced.

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Kaufman & O'Leary, 1972	Self-reinforcement Self-punishment	1 group--modified ABAB with 6 phases baseline, external reinforcement/punishment, and self-reinforce-	16 adolescent pupils in a psychiatric hospital	disruptive behavior	yes-self-control techniques maintained improved performance obtained with external reinforcement; further-more, reward and cost procedures were equally

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Kaufman & O'Leary, 1972	Self-reinforcement Self-punishment	1 group-- modified ABAB with 6 phases baseline, external reinforcement/ punishment, and self-reinforcement/self-punishment	16 adolescent pupils in a psychiatric hospital	disruptive behavior	yes-self-control techniques maintained improved performance obtained with external reinforcement; furthermore, reward and cost procedures were equally effective in obtaining and maintaining behavior change
Lovitt & Curtis, 1969	Self-imposed reinforcement standards	case study-- compared externally imposed reinforcement standards self-imposed reinforcement standards, and equated the two for magnitude of reinforcement	12 year old diagnosed with behavioral disorders	academic response rate	yes-self-imposed superior to externally imposed even when reinforcement magnitude was held constant
Mahoney, Moore, Wade, & Moura, 1973	Self-monitoring	4 group comparison-- 1. continuous self-monitoring 2. intermittent self-monitoring 3. performance feedback without monitoring 4. no information control	27 college student volunteers for a review for Graduate Record Examination (GRE)	1. time on task 2. number of items reviewed 3. speed 4. accuracy 5. math accuracy	1. yes-self-monitoring subjects spent more time in review and continuous self-monitoring enhanced the effect 2. no significant differences 3. no significant differences 4. no significant differences 5. yes-self-monitoring groups superior
Maletzky, 1974	Self-monitoring	case study--	11 year old girl with behavioral problems	out-of-seat behavior	yes-reduced by 80%

Table 1 (cont.)

Author(s)	Self-control Technique(s)	Design	Subject	Dependent Variable(s)	Effect Reported for Self-Control Techniques
McReynolds & Church, 1973	Self-monitoring and self-reinforcement in a self-contracting package	4 group comparison-- 1. study skills instruction 2. self-contracting 3. no treatment control 4. counseling	39 undergraduate volunteers who met the requirements of low grade point and reduced credit load	1. SSHA score 2. grades	1. yes-self-contracting and study skills instruction associated with significantly higher score on Work Methods and Study Habit scales

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subject	Dependent Variable(s)	Effect Reported for Self-Control Techniques
McReynolds & Church, 1973	Self-monitoring and self-reinforcement in a self-contracting package	4 group comparison-- 1. study skills instruction 2. self-contracting 3. no treatment control 4. conseling center treatment group--reading, speed, comprehension, and vocabulary	39 undergraduate volunteers who met the requirements of low grade point and reduced credit load	1. SSHA score 2. grades	1. yes-self-contracting and study skills instruction associated with significantly higher score on Work Methods and Study Habit scales 2. equivocal-significant group differences for grade points with self-contracting and study skills superior, non significant pre-post comparison on grade point average
Miller, A. & Gimpl, 1971	Self-monitoring	3 group comparison--3 different sequences over 3 weeks: 1. recorded study time, self-instructed increase, recorded study time 2. recorded study time, self-instructed increase, self-instructed increase 3. recorded study time, self-instructed increase, external reinforcement	23 college student volunteers from an introductory psychology course who indicated they studied less than 10 hours a week	# of minutes of study time	no-external reinforcement was superior to self-instructed increase which was superior to self-recording

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Richards, 1975	Self-monitoring Stimulus control	6 group comparison-- 1. no contact control 2. no treatment control 3. study skills advice	90 college student volunteers from an introductory psychology course with concern to improve study behavior;	1. course final exam 2. course grade	1. yes-self-monitoring significantly enhanced study skills advice 2. no significant difference overall; collapsed treatment groups signi-

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Techniques
Richards, 1975	Self-monitoring Stimulus control	6 group comparison-- 1. no contact control 2. no treatment control 3. study skills advice 4. study skills advice plus stimulus control 5. study skills advice plus self-monitoring 6. study skills advice plus stimulus control and self-monitoring	90 college student volunteers from an introductory psychology course with concern to improve study behavior; 18 no contact non-volunteer controls	1. course final exam 2. course grade 3. self-monitoring data 4. post-treatment evaluation questionnaire	1. yes-self-monitoring significantly enhanced study skills advice 2. no significant difference overall; collapsed treatment groups significantly better than controls; no effect due to self-control technique 3. no significant differences between groups 5 and 6; no other comparisons possible; both groups increased study time significantly over time 4. no information differential to groups reported
Richards, McReynolds, Holt, Sexton, 1976	Self-monitoring Self-reinforcement	9 group comparison-- 1. no contact control 2. no treatment control 3. study skills advice 4-9. 6 study skills advice plus self-monitoring groups in a 2x3 matrix with high versus low information feedback crossed with 3 types of self-administered consequences: a. no consequences b. covert consequences c. covert and overt consequences	87 college student volunteers from an introductory phychology course with a concern to improve study habits; 9 no contact non-volunteer controls	1. course exam 2. self-monitoring data	1. yes-self monitoring groups were superior to study skills advice which was superior to controls; self-administered consequences, however, did not enhance effect of self-monitoring, nor did high/low information feedback manipulation. 2. students whose estimates of study time were most discrepant from actual time reported during first week showed biggest increase (to level of informed students), some evidence of greater improvement on exam scores presented for uninformed students.

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Technique
Bjeidel, 1974	Self-reinforcement	3 group comparison-- 1. self-reinforcement 2. external reinforcement 3. control	45 college student volunteers	# arithmetic problems completed	yes-self- and external reinforcement equally effective and more effective than control

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subjects	Dependent Variable(s)	Effect Reported for Self-Control Technique
Speidel, 1974	Self-reinforcement	3 group comparison-- 1. self-reinforcement 2. external reinforcement 3. control	45 college student volunteers	# arithmetic problems completed	yes-self- and external reinforcement equally effective and more effective than control
Turkewitz, O'Leary, & Ironsmith, 1975	Self-monitoring Self-reinforcement	1 group--modified ABAB design with 12 phase token reinforcement program	8 7-11 year olds in transitional adjustment class and behind 1 or more years in reading	1. disruptive behavior 2. grade level improvement in reading score 3. California achievement test reading score	1. yes-self-control techniques maintained reduction obtained. 2. entire program resulted in 2.6 year increase in reader used 3. gain of 5 mos. in 4.5 month experimental period
Van Zoost & Jackson, 1974	Self-monitoring Self-reinforcement	3 group comparison 1. study skills course plus self-reinforcement for self-monitored study activities 2. study skills course plus self-reinforcement for self-monitored library activities 3. study skills course--no reinforcement for monitoring note: study skills course included weekly external reinforcement through opportunity to earn back part of deposit.	43 college student volunteers for a study skills program	1. SSHA study habits score	1. no enhancement reported for self-monitoring, self-reinforcement groups; all 3 groups reported significant increase in scores note: authors draw conclusion that self-reinforcement was effective in all three groups. Problem exists in conceptualization of self-reinforcement and absence of control group for comparison

Table 1 (cont.)

Author(s)	Self-Control Technique(s)	Design	Subject	Dependent Variable(s)	Effect Reported for Self-Control Technique
Wasserman, Brown & Reschly, 1974	Self-monitoring Self-reinforcement	case study-- AB design	2 hyperactive boys from an emotionally disturbed class with age range of 10-12	1. Andy--proportion of math assignments completed 2. Ricky--tantrum behavior	1. yes 2. yes note: adequate replication through return to baseline absent
Whitman & Dussault, 1976	Self-monitoring Self-reinforcement	case study-- ABAB 30 behaviors in a token program	male college student volunteer	academic behaviors--study time, class attendance, class participation, etc.	yes-significant increases during token periods note: baseline and token periods not completely comparable

investigations will be discussed in greater detail in the next chapter along with other studies and reviews related to self-control and academic performance that did not meet these specific requirements.

A review of Table 1 permits three preliminary observations. First, various self-control techniques have been used successfully to improve a variety of academic behaviors. Second, these techniques have been found effective in different settings and with different subjects. The diversity in subjects, settings and behaviors is important to any generalizations which are to be permitted about self-control techniques and academic performance. A closer look, however, at the academic settings used for self-control investigations indicates that 15 of the 31, nearly half, have been conducted with college students. Within this subset, nearly all of the investigations have used subjects who were volunteers from an introductory psychology course, or volunteers for a special program in study habits improvement, or something similar. Our ability to generalize to college students' academic performance is correspondingly limited. Similarly, the remaining 16 studies included elementary, junior high school, psychiatric institutions and special after school programs as settings. Despite the diversity, it appears

that too few studies have been conducted as yet to permit any generalization about academic performance across settings.

Many questions remain about the effectiveness of various self-control techniques on academic performance in various settings. The climate is improved for self-control investigations and future studies will address many of these questions. The present investigation was an attempt to address one of these questions in a comparison of two self-control techniques--self-monitoring and a combination of self-monitoring, self-reinforcement, and self-punishment. Subjects were drawn from a required college calculus and chemistry class to provide a different group of subjects for a self-control investigation. College students are a particularly suitable subject group for self-control as opposed to external control studies because many important academic behaviors of college students are not accomplished in a supervised setting like that of the elementary or secondary school classroom. It is interesting and important to know the range of applications of self-control principles with elementary and secondary school students, however, other more traditional behavior modification procedures, such as the token economy, or, contingent free time for task completion, are equally suitable for behavior change efforts. These types of external control contingencies

are not

the maj

setting

self-co

this po

gation,

of self

of the

tingenc

describ

literat

of self

as well

technic

that ex

prepara

are not as easy to apply to college student behaviors, the majority of which occur outside of the classroom setting, nor, perhaps, are they as appropriate. Hence, self-control methods have particular applicability to this population.

Before further discussion of the present investigation, a detailed explanation of the technical definition of self-control will be undertaken as well as an overview of the theoretical underpinnings. The self-control contingency and related experimental designs will be described. Following this discussion, the self-control literature will be reviewed including both the effects of self-control techniques on various outcome measures as well as the effect of other variables on self-control techniques. Attention will then refocus on the studies that examine self-control and academic performance, in preparation for discussion of the current investigation.

CHAPTER II

DEFINITION OF TERMS AND REVIEW OF THE LITERATURE

Definition of Terms

Self-control as a technical term has been well-defined by two theorists in the field--Carl Thoreson and Michael Mahoney. They assert that "a person displays self-control when in the relative absence of immediate external constraints, he engages in behavior whose probability has been less than that of alternatively available behaviors" (1974, p. 12). They elaborate this definition with a description of three important features of classical self-control phenomena.

> (1) they always involve two or more alternative behaviors
> (2) the consequences of those behaviors are usually conflicting, and
> (3) the self-regulatory pattern is usually prompted and/or maintained by external factors such as long-term consequences. (1974, p. 14)

The emphasis upon the long-term consequence is an important one in this definition for theoretical and practical reasons. The conflicting sequences of the two behaviors usually involve a short-run consequence

that is immediately pleasant or reinforcing, but ultimately aversive, versus a long-run consequence that is pleasant or reinforcing but whose short-run consequence is less desirable than that of the alternative behavior. Two examples could be smoking versus not smoking, or not studying versus studying. Obviously, the reinforcement value of any behavior or response is both person and situation-specific.

Relationship to Social Learning Theory

It is important to stress this point of long- and short-run consequence conflict in order to respond to the unwarranted accusation that the self-control literature runs counter to reinforcement concepts in behavior theory. Thoreson and Mahoney have explained succinctly that "viewing the self-control sequence at a molar level, the definition simply states that, given ultimate and sufficient incentives, a person will display response patterns whose immediate consequences may appear non-reinforcing" (1974, p. 4). The emphasis here is upon immediate consequences.

The effects of delayed consequences necessitate consideration of mediating factors and symbolic processes in the reinforcement model. Mediators are anathema to radical behaviorists whose paradigms have traditionally excluded anything and everything between a response and

its consequence. Mahoney, Kazdin, and Lesswing (1974) describe radical or metaphysical behaviorism as "(1) a denial of the existence of the mind, (2) reduction of all experience to glandular secretions and muscular movements, (3) acceptance of almost exclusive environmental determinism, and (4) avoidance of conscious processes . . ." (p. 14). They observe that this conceptualization "is a corpse which is intermittently exhumed by behavioral critics who seem to delight in its logical inadequacies" (p. 15). Methodological behaviorism, on the other hand, is "characterized by adherence to some form of operationism, microscopic determinism, logical positivism, and pragmatism" (p. 15). Although radical behaviorism in its extreme form is a rarity, the avoidance of conscious processes and de-emphasis upon the role of thought and mind is certainly still with us. Social learning theory investigations have had a significant counterbalancing effect. Thoreson and Mahoney (1974) write that

> . . . while the radical behaviorist may be perplexed by the tenacity of self-controlling responses in the absence of observable environmental influences, the researcher familiar with social learning processes recognizes the significant mediating role of self-reactions in maintaining certain behaviors. (1974, p. 15)

Social learning theory's primary spokesperson, Albert Bandura (1969, 1971, 1974a, 1977) has repeatedly stressed the role of mediating factors in human behavior

although he recognizes the importance of environmental effects, immediate and otherwise.

> Many of the things we do are designed to gain anticipated benefits and to avert future trouble. . . . The widely accepted dictum that man is ruled by response consequences thus fares better for anticipated than for actual consequences. Consider behavior on a fixed-ratio schedule (say, 50:1), in which every fiftieth response is reinforced. Since 96% of the outcomes are extinctive and only 4% are reinforcing, behavior is maintained despite its dissuading consequences. As people are exposed to variations in frequency and predictability of reinforcement, they behave on the basis of outcomes they expect to prevail on future occasions. (1974a, pp. 859-860)

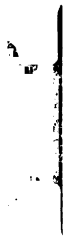
The individual's self-reactions and self-generated consequences (including self-reinforcement and self-punishment) constitute a way in which the gap between a behavior and its long-run consequence can be bridged. Given two competing behaviors, in which one behavior (not studying) has short-run positive and long-run negative consequences, while the other (studying) has short-run negative and long-run positive consequences, mediational factors can enable the long-run positive consequence to exert an influential effect in the present. Self-imposed consequences can serve as such mediational factors.

Thoreson, Mahoney, and other self-control theorists operate within a modified learning paradigm that acknowledges social learning processes such as mediation. In the foreward to Thoreson and Mahoney (1974) Bandura writes:

> Behavior theory has been undergoing major changes. For years man was viewed mainly as a respondent to environmental influences which automatically shaped and controlled his actions. On closer inspection man proved to be more active and the environment less autonomous. Influences that were believed to affect behavior automatically, in fact have limited impact unless consciously mediated. The manner in which environmental events are cognitively transformed, reduced, and elaborated determines what will be learned and how it will be retained. . . . people play an active role in producing the reinforcement contingencies that impinge upon them. Thus, behavior partly creates the environment and the environment influences the behavior in reciprocal fashion. . . . By functioning as an agent as well as an object of influence, man has some power of self-direction. Nothing typifies more clearly the operation of reciprocal processes than the phenomenon of self-control. (pp. v-vi)

The scientific technology of self-control has emerged from an integration of the cognitive and behavioral factors in the social-learning paradigm, according to Thoreson and Mahoney, and the "key to self-control lies in understanding how internal and external events function together" (1974, p. viii).

A basic and extremely important assumption of social learning theory and cognitive behavior modification is that internal or private events obey the same laws as do observable behaviors. Homme (1965) coined the word "coverant" to refer to covert operants or "operants of the mind." Homme notes that he is not the first to argue this viewpoint on private events. He quotes Skinner, "We need not suppose that events which take place within an organism's skin have special



properties for that reason" (cited by Homme, 1965, p. 501). Nonetheless, Homme calls for attention to be paid these private operants and observes that "the technology of self-reinforcement has lagged markedly behind the rest of operant conditioning's technology" (1965, p. 503). He concludes

> First, everybody is an organism and obeys the same laws of nature including the laws of reinforcement.
>
> Second, the occurrence or nonoccurrence of coverants can reliably be discriminated by at least one organism, the one to whom they are private.
>
> Third, the organism to whom the events are private can control the presentation of reinforcement in the form of permitting the occurrence of high probability behaviors. (1965, p. 510)

Thus, within social learning theory, reinforcement (self or external) can be applied to covert events, and furthermore, such reinforcement can itself be covert. This is a dramatic departure from the prior emphasis upon external behavior, overt consequences, and external control.

The Self-Control Contingency

An elaboration of relevant aspects of social learning theory and cognitive behavior modification is essential to an understanding of self-control techniques. Description of the basic assumptions, such as the correspondence between external and internal events, is important also. Similarly, familiarity with the technical definition of self-control is necessary. This definition has been outlined and it is important to note that the

terms "self-regulation and self-management" are often used interchangeably for self-control (Thoreson & Mahoney, 1974, p. 15). It is important, now, to focus on the self-control contingency and to distinguish the controlled response (CR) from the self-controlling response (SCR). Skinner first used these terms in his early discussion of self-control (1953, p. 230) and Mahoney and Thoreson have elaborated them. Controlled responses are those which we seek to modify--to accelerate or decelerate. (Controlled responses are also referred to as target behaviors, outcome measures, or dependent variables.) The CR can be modified by self-controlling responses (independent variables) and there are two major types of SCR's--environmental planning and behavioral programming.

Environmental planning entails the use of a method by which "the individual plans and implements changes in relevant situational factors prior to the execution of a target behavior" (Thoreson & Mahoney, 1974, p. 16). This type of SCR has been referred to, also, as stimulus control or antecedent control because it seeks to change the stimuli which are antecedent and presumably initiate or influence the behavior's occurrence (i.e., a place for study is selected and no other activities are permitted there).

adm

fol

(CR

smo

par

con

the

Mah

cal

adm

Behavioral programming SCR's involve self-administered consequences that are contingent upon and follow rather than precede the behavior to be controlled (CR) (i.e., an individual might tear up a dollar after smoking a cigarette). Thoreson and Mahoney present a partial list of such SCR's. These self-administered consequences serve as mediators between the behavior and the long-run consequence, whose effect is weaker.

> 1. Self-observation: the recording, charting and/or display of information relevant to a controlled response (e.g., charting one's weight).
> 2. Positive self-reward: the self-administration or consumption of a freely available reinforcer only after performance of a specific, positive response (e.g., treating one's self to a special event for having lost weight).
> 3. Negative self-reward: the avoidance of or escape from a freely avoidable aversive stimulus only after performance of a specific, positive response (e.g., removing an uncomplimentary pig poster from one's dining room whenever a diet is adhered to for a full day).
> 4. Positive self-punishment: the removal of a freely available reinforcer after the performance of a specific negative response (e.g., tearing up a dollar bill for every 100 calories in excess of one's daily limit).
> 5. Negative self-punishment: the presentation of a freely avoidable aversive stimulus after the performance of a specific, negative response (e.g., presenting oneself with a noxious odor after each occurrence of snacking). (1974, pp. 21-22)

Mahoney and Thoreson note that investigations have typically utilized behavioral programming SCR's (self-administered consequences) rather than environmental

planning strategies (antecedent control). The present review concentrates on studies using behavioral programming.

Self-Control Designs

It is important to consider one final aspect of self-control investigations--experimental design. (Reference to such designs was included in Table 1 in Chapter 1.) According to Thoreson and Mahoney (1974), two designs predominate; namely, empirical case studies and empirical group studies (p. 30). The empirical case study examines one subject at a time. The most popular design used in such single-subject designs is an "operant reversal" or ABAB design. A subject target response (CR) is monitored under a baseline condition (A), an experimental or intervention condition (B) a reversal to baseline (A_2), and then a reintervention (B_2) condition. Demonstration that behavior covaries with the presence or absence of intervention is deemed sufficient to indicate treatment effect. Problems with use of this design occur when reversing a behavior is not desirable (i.e., tantrum behavior or weight loss) or not possible (return to baseline for cognitive skills).

A second type of empirical case study design involves two or more behaviors and is called a multiple-baseline design. Data are collected on both behaviors simultaneously during baseline. During intervention

on
an
of
wh
co
re
ac
li
th
ty

di
gr
de
si
de
id
th
of
ex
nu
in
tr
in
ex
co

only one behavior is initially subjected to intervention and the other remains unmodified. Sequential treatment of each behavior occurs and changes in the behaviors which covary with the introduction of the experimental condition are concluded to be causally or functionally related. Comparisons can be made, then, across behaviors, across situations, and across subjects. When designs like ABAB or multiple-baseline are used across subjects they are, in essence, group designs with a particular type of format--that of a single-subject case study.

More typically, empirical group designs compare different experimental conditions assigned to different groups. Treatment effect is demonstrated when the dependent variables or outcome measures for each group differ significantly from one another. A comparison of such a design with an empirical case study investigation of an identical experimental issue is helpful to understanding the essential differences. A case study investigation of the effect of a contract to study 6 hours a day, for example, would begin with a baseline record of the number of hours studied (A_1). The period of experimental intervention (B_1) is marked by the beginning of the contract. Then, a baseline period (A_2) would again occur in which the contract was not in effect. Finally, an experimental reintervention (B_2) would begin when the contract was reinvoked. The effects upon reported study

time over these four phases would be compared. In an empirical group study, subjects might be randomly assigned to two conditions--contract and no contract. The effects upon mean reported study time for the two groups would be compared.

A type of hybrid design occurring in the literature is one in which the design of an empirical case study is applied to one entire group and their mean performance on the dependent variable across the ABAB phases is examined. Examples of this design are included, as well, among the studies on self-control and academic performance which were outlined in Table 1.

It is important to stress that both case studies and group designs have their strengths and weaknesses and address themselves to particular experimental questions. The bias in social science toward group designs and statistical analysis is inappropriate. As Thoreson and Mahoney have argued, in "individual clinical instances in which neither generalizability nor treatment comparisons are of prime interest, intensive study of the single subject offers a powerful as well as practical format" (1974, p. 34). There are other appropriate applications as well.

When the questions under investigation are most appropriately addressed through an empirical group study,

Thoreson and Mahoney underscore the importance of adequate comparison or control groups.

> One of the more crucial factors in the evaluation of group-based research is whether adequate control groups have been employed. For example, if one were to read a study reporting substantial weight loss on the part of subjects who charted and rewarded their dietetic progress, the interpretation of these results would weigh heavily on at least two comparisons: (1) How did the above subjects compare with subjects who simply charted their progress, and (2) how did they compare with subjects who engaged in neither self-charting nor self-reward? The results of a study are more easily interpretable when any and all possible independent variables have been isolated. If Factor A had no effect, but Factor B did (either in a separate group or when combined with A), then we have some indication that B is the active ingredient. (1974, p. 34)

Thus, it is important to compare the effect of self-monitoring (also called self-observation and self-charting) with self-reward (or self-punishment), either alone or in combination with self-monitoring, and, to compare both with a control group who did neither.

Self-Control Techniques as Independent Variables

The theoretical framework and technical definitions of self-control have been outlined as well as the specifics of the self-control contingency. Furthermore, self-control designs have been described. It is important now to examine the self-control literature that pertains directly to self-monitoring, self-reinforcement, and self-punishment. First, self-monitoring contingencies must be assessed with regard to effects, choice of the

behavior to be monitored, and accuracy or reliability of reported measurements. Second, the ability of various self-control techniques (SCR's) to modify behaviors (CR's) is of critical importance and must be determined. Most importantly, self-reinforcement techniques must be assessed relative to other self-control methods (self-monitoring and self-punishment) and relative to external reinforcement contingencies. Bandura (1974b) acknowledged the importance of determining "whether self-administered consequences do in fact serve a reinforcing function by influencing response output" (p. 301). Their comparative strengths must be determined also.

It is important, as well, to review those studies in which the essential question concerns "how behavioral standards for self-reinforcement are acquired and modified" (Bandura, 1974b, p. 301). Bandura has noted the need to distinguish investigations in which the self-control technique is the independent variable whose effects are observed, from those in which the self-control technique is the dependent variable. From the latter type of investigation we may be able to learn the basis for some of the individual variation we observe.

Self-monitoring

The act of self-observing has been described by several authors as a reactive measuring procedure (Kazdin, 1974a, 1974b; Lipinski & Nelson, 1974; Lipinski, Black, &

Nelson, 1975; McFall, 1970). However, Thoreson and Mahoney (1974), Kazdin (1974a, 1974b) and others argue that self-observation should be regarded as a self-control technique, a treatment or experimental condition in and of itself, rather than merely a reactive measurement. Thoreson and Mahoney write:

> Behavioral self-observation stresses the detailed counting, charting, and evaluation of particular responses, either overt or covert. A growing number of studies has provided evidence that both the systematic counting and charting of certain actions are associated with positive changes in behavior. (1974, p. 134)

Kazdin observed that the act of self-recording led to behavior change (1974a) as did Kanfer (1975).

Several other studies have noted this effect on a variety of dependent variables such as stuttering (Lanyon & Barocas, 1975); cigarette consumption (Karoly & Doyle, 1975; McFall & Hammen, 1971; Rozensky, 1974); weight loss (Romanczyk, Tracey, Wilson, & Thorpe, 1973; Stollak, 1967; Stuart & Davis, 1974); fingernail-biting (Horan, Hoffman, & Macri, 1974); ecological acts (Hoon, 1976); attendance at swim practice and increased laps during practice (McKenzie & Rushall, 1974); verbal responding (Robertshaw, Kelly, & Hiebert, 1974); auditory hallucinations (Rutner & Bugle, 1969); compulsive behaviors (Jason, 1976); obsessive thoughts (Frederiksen, 1975); phobic behaviors (Leitenberg, Agras, Thomson, &

Wright, 1968); tics (Hutzell, Platzek, & Logue, 1974; Thomas, Abrams, & Johnson, 1971).

Maletzky (1974) reported on five different case studies in which behavior counting was successful in reducing or eliminating undesirable behaviors. The case studies included a 52-year-old woman with a 30-year history of severe repetitive scratching, a 9-year-old boy with bizarre handwaving, and a 65-year-old woman with a 12-year history of facial tics. The behavior of these three declined to 0 within a few weeks and remained at 0 at 6- or 12-month follow-ups. Behavior in two other case studies involving severe nail-biting in a 20-year-old and troublesome out-of-seat behavior in an 11-year-old was reduced significantly. Maletzky notes that patients remarked that the wrist counter which was used served to remind them not to emit the behavior. It appears that self-monitoring of a response targeted for acceleration or deceleration has been associated with a change in the desired direction. Thus, self-monitoring appears to be more than a reactive measurement.

Examination of two parameters of self-monitoring have been reported--continuous versus intermittent self-monitoring and timing of the act of monitoring. Frederiksen, Epstein, and Kosevsky (1975) examined three procedures for self-monitoring and found continuous

recording of cigarettes smoked to be superior to either daily or weekly intermittent procedures in achieving smoking reduction. Bellack, Rozensky, and Schwartz (1974) compared the timing of monitoring eating behavior in weight reduction programs. They found differential effects for prebehavior monitoring and postbehavior monitoring. They argue that "self-monitoring is not, in and of itself, a behavior change agent, but rather it provides information which may or may not then be used to modify future behavior. The usefulness will vary with the content, the time, and the nature of the monitoring" (p. 529).

The importance of the particular behavior selected for monitoring has been noted by Romancyzk (1974) who found monitoring daily weight and caloric intake to be as effective in achieving weight loss as a full treatment group with a therapist. He reports that the group that simply monitored daily weight evidenced no losses and concludes that the act of self-monitoring is not the critical variable, but the presence of frequent and immediate feedback contiguous to eating.

McFall (1970) and Gottman and McFall (1972) likewise stressed the importance of the particular behavior selected for monitoring. Individuals who monitored smoking increased their smoking while those who monitored not smoking increased not smoking (McFall,

1970). Orne (1970) is critical of this study for a variety of reasons, including the implicit cues from the experimenter, who was also the instructor, as to the desired behavior. He is also critical of the selection of classroom smoking behavior as the dependent variable because of the lack of generalizability. It is one thing to demonstrate that a patient does not eat with the therapist, and quite another to demonstrate changed eating behavior, Orne quips.

In another study, monitoring the frequency of class participation increased this behavior, whereas, monitoring nonparticipation increased that behavior (Gottman & McFall, 1972). The authors were able to reverse this effect with the same subjects by changing the behavior monitored. Wade (1974) reported opposite effects. He found that the performance of college students who monitored correct or incorrect math responses was superior to those who simply received performance feedback, and, to controls. However, a decline in performance over time was obtained for subjects who recorded their correct matches. It appears that care must be taken in the selection of the behavior to be monitored and there is some evidence that the behavior selected should be the one targeted for an increase.

Reliability of Self-monitoring

Yet another interesting facet of the self-monitoring literature concerns the accuracy or reliability of the act of self-monitoring. Some of the studies mentioned above employed independent observers to corroborate the self-monitoring data. Others did not. Simkins (1971b) is critical of investigators who do not obtain reliability estimates of the self-monitored behavior. He also notes that the use of a wrist counter or similar gadget to facilitate recording does not necessarily assure accurate and reliable responding.

> The use of a wrist counter does not guarantee that behaviors incompatible with the behavior of pressing the counter may not be prepotent, so that the subject does not press the counter each time the event or behavior occurs. Of course, if the behavior is a "private" one, the discrepancies, if any, would never be discovered. There are two behaviors required of the subject; one is the behavior under investigation, the other is pressing the wrist counter. (p. 86)

One response to Simkins is that this criticism can be made of other ways of collecting data--there is the behavior and then there is the questionnaire item; there is the behavior and then there is the "independent" observer's observation, etc.

Returning to the issue of reliability estimates, Nelson and McReynolds (1971) replied to Simkins by acknowledging that reliability data should be collected when possible. However, when the type of behavior under

investigation is not amenable to the collection of reliability data, such as covert responding, investigations should continue. A distinction must be made, they argue, between determining the effects of self-recording procedures and controlling for them through the use of a comparison group which only monitors. Simkins (1971a) acknowledged the merit of this idea but persists in calls for reliability estimates "in any study dealing with the self-recording of behavior" (p. 600). It is important to note that this would effectively eliminate much research on covert responding.

An excellent discussion of traditional methods of reliability assessment concludes that such methods are themselves unreliable. Five trained undergraduate observers with at least three months experience in recording were observed in a two-phase study. Two assessors with two years of experience as trained observers were used for reliability checks. In the preexperimental phase one assessor strictly adhered to the specified code and one assessor adopted a slightly modified code which resulted in slightly higher frequencies of certain behaviors. These differences were never discussed but were apparent when different assessors were used for reliability checks with each observer. This was the observers' only opportunity to note the modified code.

In the experimental phase the assessors were also present daily but as during the preexperimental phase they were not ostensibly involved in reliability checks on most days. They had other tasks to perform, such as developing a unique code for a given child. In actuality they were performing reliability checks each day. On some days, observers were not told reliability checks were being performed. On other days, they were told and, furthermore, they were told which assessor was making the check.

The findings were quite interesting. When reliability checks were being conducted covertly observers recorded lower frequency of behaviors--75% of the frequency recorded during overt reliability assessment. Romancyzk, Kent, Diament, and O'Leary (1973) note that "both the frequencies and reliabilities of behavior recorded were consistently increased by knowledge that reliability was being assessed" (p. 180). Furthermore, the authors report that "observers shifted their observational criteria to match the idiosyncratic criteria employed respectively by the two assessors" (p. 180). One implication of this study is that the use of different assessors with different experimental conditions can result in a serious confounding variable.

The overall implications are also serious. As the authors indicated "it is generally assumed that the

process of reliability assessment is non-reactive; that obtained reliability coefficients reflect the general adequacy of the observational process at times when reliability is not being measured" (p. 176). It appears that this is not the case. Traditional methods of obtaining accurate observations of behavior and estimates of the degree of accuracy are themselves seriously flawed. This should not be surprising. Cavior and Marabotto (1976) reported no difference between self-monitoring and external monitoring, indicating that behavioral changes that accompany monitoring are due to the reactive process of being observed.

Three important conclusions can be drawn. One is that monitoring affects behavior (and that includes monitoring "monitoring behaviors" as in reliability checks). Two, traditional methods of assessing reliability are flawed. The inability to use such methods when behavior change is undertaken in a self-control paradigm should not preclude the use of the paradigm. Three, the reactive effects of monitoring can be used in a self-monitoring contingency to facilitate an individual's behavior change efforts.

Kazdin's (1974b) remarks on the reliability issue are important. He notes that

> . . . the importance of SM [self-monitoring] reliability varies with the purpose for which SM is employed. When SM is used as an assessment

> technique, reliability is exceedingly important, when it is used as a behavior-change technique, the consistency and accuracy of measurement are certainly less crucial and perhaps irrelevant. (p. 231)

Herbert and Baer (1972) reported that behavior change was associated with self-monitoring despite inaccuracies. They write that "the inaccuracy of the feedback is not crucial to the effectiveness of the procedure. . . . However, there may be lower limits to the accuracy of self-recording below which the procedure is ineffective" (p. 148). Broden, Hall, and Mitts (1971) have concluded that accuracy in self-monitoring was not essential to obtain effects in a case study investigation of study behavior. They write that a correlation between the subjects' estimate and her actual behavior "was not necessary to achieve or maintain high study rates" (p. 198). They used an independent observer with whom comparisons were made.

One possible explanation for these findings is that the act of self-monitoring and concomitant evaluation processes can occur, in certain circumstances, without the tangential act of recording and public display. This comes very close to a completely intrinsic self-control process and seems to be a reasonable last step in the progression from external reinforcement to public self-reinforcement to a truly private self-reinforcement event. Inherent in this analysis, then,

is the notion that the effect of self-monitoring is due to an implicit self-evaluation process (including self-reinforcement and self-punishment). Stuart (1967) remarks that the recording of weight four times daily for an obese person "serves as a periodic, mildly aversive stimulus associated with over-eating" (p. 359). The self-monitoring effect is not due to some magical result of writing down one's behavior, but to systematically subjecting it to scrutiny, evaluation, and change.

Thus, self-monitoring effects are likely to be due to covert evaluative processes and the distinction between self-monitoring conditions and combination conditions (self-monitoring, self-reinforcement, and self-punishment) is the degree to which the latter contingencies are explicit. Bellack (1976) discusses this issue.

> A direct comparison between SM and SR is not possible. Subjects instructed to SR must SM first. Subjects instructed to SM can freely administer covert SR. . . . In the present study, the comparison is between two self-monitoring conditions: one accompanied by intermittent covert SR and the other by fairly continuous overt and covert SR. While it cannot be concluded that SR in isolation is more effective than SM in isolation, the clinically applicable differentiation of the two procedures seems clear. The explicit use of SR critically augments whatever effects SM has. (pp. 73-74)

Bellack goes on to say that "the question of whether SM affects behavior directly or simply allows for the occurrence of SR cannot be fully answered, until and unless there is adequate control over the administration of

covert SR" (p. 74). It may not be important to answer this question or to ask it. What may be important is to distinguish when self-monitoring plus covert reinforcement is sufficient and when it must be augmented with overt self-reinforcement.

Investigations which seek to compare self-monitoring with the techniques of explicit self-reinforcement or self-punishment are not as conclusive as those which demonstrate the effect of self-monitoring alone. Some investigations reported that self-monitoring was as effective as these other techniques (Lanyon & Barocas, 1975; Romanczyk, Tracey, Wilson, & Thorpe, 1973), whereas other investigations have not (Mahoney, 1974; Mahoney, Moura, & Wade, 1973; Thoreson & Mahoney, 1974). Thoreson and Mahoney provide a fair, though tentative, conclusion about relative effectiveness. They write that "as a treatment technique the effects of self-observation are often variable and short-lived. Unless supplemented by additional behavior change influences (e.g., social reinforcement), self-monitoring does not offer promises in the long-term maintenance of effectual behavior" (p. 63). This is a reasonable statement that can be interpreted to mean that most of us have not developed our covert self-reinforcing contingencies as well as our overt ones. Thus, explicit self-reinforcement/punishment strategies should be expected to enhance self-monitoring in most cases.

S

o
c
a
t
f
n
p
f
a
s
r
t

r
b
e
e
a
P
H
M
S
f

Self-reinforcement

If it is surprising to some that the "mere" act of systematic self-observation is productive of positive change it is equally surprising to others that self-administered reinforcement or punishment is also effective, and as effective as externally administered reinforcement, in many cases. Thoreson and Mahoney (1974) note that "positive self-reward, in which a person presents himself with a freely available positive reinforcer that is contingent upon his performing a certain action, has been the subject of a host of laboratory studies" (p. 135). "Generally," they conclude, "self-reward has been shown to be comparable in effectiveness to reinforcement that is externally administered" (p. 136).

In a comparison of self-reward and experimenter reward on the number of arithmetic problems completed by college students, Speidel (1974) found them equally effective and concluded that self-reward had reinforcing effects. Glynn (1970) and others reported that self- and external reward were equally effective (Bandura & Perloff, 1967; Bellack, Schwartz, & Rozensky, S. M. Hall, 1973; Johnson, 1969; Johnson, 1970; Johnson & Martin, 1973; Kanfer & Duerfeldt, 1967c; Liebert, Spiegler, & Hall, 1970). Kanfer and Duerfeldt (1967b) found that external and self-reward were equally ineffective in facilitating recall following

overlearning of a paired-associate task. They write that

> . . . under conditions of high certainty by S [the subject] of the appropriateness of his response, the increments associated with feedback by E [the experimenter] or S himself may play a less important role than the necessary interference with continued responding. (p. 196)

Lovitt and Curtiss (1969) found higher academic rates when students determined their contingencies rather than teachers. They further noted that this effect was independent of reinforcement magnitude in this case study investigation. Marston (1967) reported self-reinforcement to be superior to external reinforcement in a visual-motor task. Rozensky and Bellack (1976) found self-reinforcement more effective than external control in a weight loss program. S. M. Hall (1972) reported the reverse. Balfour (1974) reported that they were equally effective for weight loss. Bolstad and Johnson (1974) noted that self-regulation procedures were more effective than externally managed procedures in the modification of disruptive classroom behavior.

In noncomparative studies, self-reinforcement techniques are typically found effective in obtaining behavior change. Todd (1972) reported the successful use of self-reinforcement to control depressive thoughts and Jackson (1972) found similar success in decreasing reported depression through self-reinforcement of task

performance. Miller and Clark (1970) reported that a combination of self-administered candy and verbal self-reinforcement was most effective in facilitating new learning on a discrimination task. Self-reinforcement enhanced the matching performance of elementary school children, also (Montgomery & Parton, 1970).

With regard to weight loss, Horan and Johnson (1971) did not report conclusive results with self-reinforced coverants. However, Balfour and Christenson (1975) reported that a behavioral therapy treatment group, which included self-monitoring and self-reinforcement in a self-contracting format, was more effective in obtaining weight loss than either a will-power group or a no-treatment control. In a case study, Martin and Sachs (1973) reported that a combination of self-reinforcement and stimulus control resulted in significant weight loss in an obese woman.

The effectiveness of self-reinforcement appears to be well-documented, however, the notion of self-reinforcement is not without controversy. Catania (1975) argues that there is little evidence that self-reinforcement raises the likelihood of self-reinforced responses despite numerous studies previously reviewed. He argues that self-reinforcement is really only a process of discrimination--the individual is aware that a certain performance is adequate. He discusses an example in

which a student purportedly used self-reinforcement techniques to facilitate study behavior.

> Suppose that the student is highly competent in discriminating an effectively completed assignment from an ineffectively completed one. The problem at this point is that the student would self-reinforce the completion of the assignment only if its completion were already sufficiently important, that the completion alone would be sufficiently reinforcing anyway. . . . What then is the point of self-reinforcement? (p. 197)

It seems that Catania has missed the point. It is precisely because the completion of the assignment is not sufficiently important for it to be "reinforcing anyway" that an additional contingency is added. In the case where the completion is sufficiently reinforcing, we still have an example of self-reinforcement in which the student's self-evaluation process enters in. Catania argues "self-discrimination remains; the rest is mythical" (p. 198). Self-discrimination is necessary, but not sufficient; self-evaluation must be present as well. Catania's criticism is flawed at the point at which he fails to see self-evaluation as a kind of self-reinforcement and self-punishment process. Bandura (1976) includes a comprehensive analysis and critique of Catania's position.

Goldiamond (1976a, 1976b) objects to the use of the term "self-reinforcement" and contends that operant reinforcement can only occur when there is independence between the individual who emits a response and the

individual or entity (such as a computer) that determines that a response requirement has been met. He asserts that "a reinforcement contingency presupposes such independence, absent in self-reinforcement" (1976b, p. 509). Goldiamond does not appear to be arguing that the kinds of behaviors we are discussing do not occur. He simply regards "self-reinforcement" as a misnomer, and, an important one, due to subsequent inferred similarity to the operant paradigm. He notes that at any time the subject in a self-reinforcement contingency can drop the contingency and take the reinforcement. This is not the case in operant reinforcement and therefore, self-reinforcement is not operant reinforcement, although it is somewhat parallel. Thoreson and Wilbur (1976) and Mahoney (1976) offer interesting discussion of Goldiamond's paper but they do not address his basic point.

Gewirtz (1971) takes a different approach in his criticism of the concept of self-reinforcement by attributing behavioral effects obtained under such conditions to external reinforcement on a high variable ratio schedule. Stuart (1972) makes a similar point asserting that "the behaviors commonly ascribed to self-control can be functionally analyzed as a special subset of operant responses which are, in fact, under situational control" (p. 130). These conceptualizations have merit

in that many authors attribute the genesis of self-reinforcement to external reinforcement training through direct instruction or modeling which is then adopted. In his discussion of internalized control over behavior, Aronfreed (1968) contends that an act is internalized "to the extent its maintenance has become independent of external outcomes--that is, to the extent that its reinforcing consequences are internally mediated with the support of external events such as reward and punishment" (p. 18). There is certainly a relationship between self-reinforcement and external reinforcement that needs examination.

Self-punishment

The self-punishment contingency is used far less often and less conclusive evidence is available. In their investigation of weight gain, Gulanick, Woodburn, and Rim (1975) found self-punishment inferior to self-reward. Mahoney, Moura, and Wade (1973) found the same in their comparison of techniques to reduce weight. They note that "an empirical comparison of self-reward and self-punishment strategies is complicated by such factors as control for frequency of application (which is in turn altered by their relative effectiveness)" (p. 407). Weingartner (1971) failed to obtain differential results in a comparison of self-administered shock and placebo on hallucination behavior of schizophrenics.

Conversely, Axelrod, Hall, Weis, and Rohrer (1974) found self-punishment to be effective in reducing smoking behavior in two case studies. Self-punishment was operationally defined in one case as the requirement of shredding $1.00 for each day when cigarette-smoking exceeded the maximum specified. In the other case, 25¢ was donated to charity for each cigarette smoked. Similarly, Mahoney (1971) reported the successful use of self-punishment in reducing obsessive thoughts to zero in a 22-year-old veteran. He was instructed to snap a heavy gauge rubber band on his wrist whenever such thoughts occurred. Berecz (1972) reported the successful reduction of smoking through self-administered shock for imagined and actual behavior. Moser (1974) found a combination of self-monitoring and covert self-punishment to be effective in eliminating hallucinatory behavior in a male paranoid schizophrenic. Bellack, Glanz, and Simon (1976) reported self-reinforcement and self-punishment operationalized as positive and negative self-imagery to be equally effective in obtaining weight loss. Horan, Hoffman, and Macri (1974) found self-punishment to be more effective than self-reward in their attempts to modify nail-biting.

In a comparison of combination of techniques including self-reinforcement and self-punishment, self-punishment, and a control, Tyler and Straughan (1970)

obtained no significant differences in weight loss. Harris (1969) also used a combination of techniques and then assigned one-half of the experimental group to an aversive control condition. She found that weight loss occurred in all groups, but those undergoing aversive control lost the most.

One reason that there are relatively few self-punishment studies is because they are often mislabeled "negative reinforcement." The Harris (1969) study just mentioned used a punishment contingency but described it as negative reinforcement, and this is common (Bandura & Walters, 1972; Haynes & Kanfer, 1971; Kanfer & Duerfeldt, 1967c; Kanfer & Duerfeldt, 1968; Kanger, Duerfeldt, & LePage, 1969; Kanfer & Marston, 1963b; and Marston & Cohen, 1966 provide a few more examples from studies presently reviewed). It is this author's opinion that the long-standing negative bias in psychology and education toward the punishment contingency and the continued confusion over conceptual and operational definitions of the term have so confused and distorted the issue that a meaningful discussion of research results on punishment, self or otherwise, is difficult (Myers, 1975).

From a conceptual and operational standpoint self-reinforcement and self-punishment conditions are very difficult to separate. For example, the act of

rewarding oneself for X performance implies not rewarding oneself for Y performance. The act of not rewarding oneself is clearly an example of positive self-punishment--the withholding of a freely available reinforcer after the performance of a specific negative response (Thoreson & Mahoney, 1974, p. 22). That is, rewarding yourself for studying for 10 hours implies you will not be rewarding yourself for less than 10 hours. The latter is an example of a punishment contingency. Thus, upon careful examination of many investigations reportedly utilizing only a self-reinforcement contingency, one finds that both reinforcement and punishment contingencies are integrally present and operational. In conclusion, then, it seems apparent that the positive effects for self-reinforcement studies discussed earlier imply positive effects for self-punishment as well. Certainly the effects have not been untangled.

The issues relating to self-monitoring, self-reinforcement, and self-punishment in the self-control literature have been outlined. Self-monitoring and self-reinforcement have been shown to be effective in modifying behavior. Studies which explicitly include self-punishment are fewer in number and results are mixed. The effects of self-monitoring appear to be enhanced by self-reinforcement contingencies, however, the difficulty of actually separating the two conditions has been

described. A reconceptualization has been offered placing what is usually called simply self-monitoring, and the combination of self-monitoring plus self-reinforcement, on a continuum of covert-overt reinforcement. This continuum could also be referred to as covert-overt self-punishment as well, and the interrelationship of self-reinforcement and self-punishment has been described.

As may be apparent, many of the investigations which use self-control contingencies are therapeutic interventions and attempts to control behavior problems such as stuttering, weight gain, nail-biting, and smoking. The self-control techniques in these investigations are independent variables whose effect on behaviors is observed. The self-control field is large and some overview of the general effects of these SCR's--self-monitoring, self-reinforcement, self-punishment is appropriate and necessary for a thorough understanding of associated theoretical and methodological issues.

Self-Control Techniques as Dependent Variables

An overview of studies that examine the effect of other independent variables on self-control behaviors is also important to a complete understanding of the field. Such independent variables include direct instruction in self-control; prior external reinforcement;

model standards; social comparisons; model characteristics; subject characteristics (i.e., age, sex, socioeconomic status, degree of learning, personality variables); task, reinforcer, and situational characteristics. Studies that include self-control techniques as dependent variables will now be reviewed.

Direct Instruction and Prior External Reinforcement

Mischel and Liebert (1967) write that "an important aspect of self-control is the manner in which individuals regulate the self-administration of rewards and punishments that are available to them without external constraints." They go on to note that individuals "learn to evaluate their own performance and make self-reward contingent on criteria such as the attainment of particular performance levels. Likewise, failure to achieve these criteria may result in self-punitive behavior or self-denial" (p. 673).

Two very important ways in which this learning takes place are through direct instruction and prior external reinforcement. Heldebrandt, Feldman, and Ditrichs (1973) indicated that instruction and rules for self-reinforcement affected subsequent self-reinforcement behavior. Marston (1969) reported that differential reinforcement of self-reinforcement affected subsequent self-reinforcement rates. Many

authors have noted the effect that prior external reinforcement plays in establishing self-reinforcement rates (Bass, 1972; Kanfer & Duerfeldt, 1967a; Kanfer & Duerfeldt, 1968; Kanfer, Duerfeldt, & LePage, 1969; Kanfer & Marston, 1963a; Karoly & Kanfer, 1974; Marston, 1964b; Marston & Kanfer, 1963).

Modeling Effects

Another important way that individuals learn to evaluate behavior and make contingent self-reward is through the effect of models. Bandura and Walters (1972) discuss the acquisition of self-control through modeling.

> Demonstrations that inhibitions and self-evaluation responses may be learned without the mediation of direct reinforcement are consistent with commonsense thinking. Socialization agents, for example, parents and teachers, frequently make use of exemplary models and from time to time reward or punish children in front of others in the expectation that the positive or negative reinforcement will influence the future behavior of observers. (p. 296)

Numerous studies have reported the effect of models on self-reward behavior. Modeled instruction has been shown to be as effective as direct instruction about performance standards for self-reward (Liebert & Allen, 1967; Liebert & Ora, 1968; Liebert, Hanratty, & Hill, 1969). Bandura and Mischel (1965) reported that children readily matched either the high or the low performance standard set for self-reinforcement by their particular model. Marston (1965) reported children imitated a

model's self-reinforcement criterion and Herbert, Gelfand, and Hartmann (1969) report modeling effects for children's self-critical behavior as well. Bandura and Kupers (1964) obtained modeling effects for self-approving and self-critical behaviors. Kanfer and Duerfeldt (1968) found that subjects matched the modeled rate of external reinforcement but self-administered less self-criticism (incorrectly labeled negative reinforcement). Heldebrandt, Feldman, and Ditrichs (1973) reported that self-reinforcement rates were a function of both instruction in a rule for reinforcement and a model's behavior. Acceptance of the rule was enhanced when the most recent model's behavior and the rule were concordant.

A group of children with a demonstrated preference for immediate but less valuable rewards were shown to reverse this behavior when they observed either a live or a symbolic verbal model exhibiting the opposite behavior (Bandura & Mischel, 1965). Prior direct instructions by the experimenter about self-reward criteria were either adhered to or violated by 9- and 10-year-old children who emulated models obeying or disobeying the experimenter (Hill & Liebert, 1968). Powerful modeling effects are evident when behavior is reversed and direct instruction is thwarted.

Both self-reinforcement and the reinforcement administered to another were affected by a model's

standard as college students adopted that standard (Marston & Smith, 1968). Mischel and Liebert (1966) also found that the most stringent standards of self-reward were obtained with 4th and 5th grade children when models imposed a stringent standard on themselves and on the child. In cases of discrepant standards, the child emulated the standards actually imposed on him/her, and furthermore, imposed this standard on others. The authors' comments are interesting.

> The study demonstrated that consistency in the standards which an individual is trained to use for himself and those he observes used by social agents facilitates the adoption and transmission of these standards and pointed to some variables that can determine the performance levels which the person adopts for his own self-reward and for reinforcing others. . . . There is abundant clinical evidence that for troubled individuals the inappropriate regulation of self-administered rewards and punishment often is a central problem. A host of deviant behavior patterns, such as psychopathy, masochism, depression, sadism, etc., may be construed as reflecting the inappropriate regulation of self-administered rewards and punishments and the imposition of excessively harsh or generous standards on other people. The isolation of antecedents of self-control therefore seems to have particular importance. (p. 53)

Discrepant standards were also examined by Masters (1968, 1969) in a social comparison framework. He found that preschool age children were affected by inequity manipulations. The children played a game in which the subject received fewer, more, or equal reinforcement relative to a younger peer. Subsequently, the self-reinforcement rate was highest for children who

previously received less reinforcement than their younger peer. The rate was most stringent when rewards to both had previously been equal.

Certain characteristics of models have been found to enhance or diminish modeling effects. Bandura, Grusec, and Menlove (1967) reported on the effects of three variables--model nurturance, social reinforcement of a model's high standard setting behavior, and presence or absence of a peer model who adopts a low standard of self-reward. They found that vicarious positive reinforcement enhanced emulation of severe standards by children aged 7 to 11 years old, whereas exposure to a more nurturant model or conflicting peer standards reduced emulation. Masters (1971) reported an interesting finding that 4- and 5-year-old children administered more self-reinforcement when the experimenter was female. This would certainly have implications for all studies using self-reinforcement as a dependent variable and needs further investigation.

Adults were more influential than peer models in a study by Bandura and Kupers (1964). Models perceived by 2nd and 3rd grade children as more powerful exerted more influence on self-reward criteria (Mischel & Liebert, 1967). Bandura and Whalen (1966) reported an interesting interaction between model competence and self-reinforcement criteria. Children emulated inferior models

displaying low performance criteria but they did not emulate superior models displaying high criteria. They established a criterion nearer to their own ability level instead. Colle and Bee (1968), however, did not obtain differential effects on self-reinforcement for high-low model competence.

Subject Characteristics

In addition to the effects of modeled behavior and model characteristics, self-control behaviors are affected by characteristics of the subjects themselves. In a developmental study comparing 543 children in grades 2nd through 8th, Kanfer (1966) reported that inappropriate self-reward decreased with age. Masters (1973) made the same observation with 4- and 7-year-olds. Colle and Bee (1968) reported significant effects of socio-economic status (SES) with boys aged 8 to 13. The higher the SES, the higher the standard setting for self-reward. Haynes and Kanfer (1971) also reported that third and fourth grade boys, whose standing in their classroom was higher, evidenced lower self-reinforcement rates and more self-critical behavior. Conversely, Reschly (1973) indicated that neither sex nor ability level was correlated with self-reinforcement rates. However, self-esteem estimates were positively correlated with self-reinforcement rates for seventh graders (Reschly & Mittman, 1973).

Masters (1972) found that subjects who experienced success on a task generally increased self-reinforcement, however, self-reinforcement following failure only increased if the self-reinforcement was not contingent on the task, or was contingent on a dissimilar task. In comparing the self-reinforced performance of college males, Kanfer, Bradley, and Marston (1962) reported that students receiving discrimination training for 50 trials administered more correct self-reinforcement than those who had 25 trials of training. Other studies also reported correct self-reinforcement is related to degree of learning (Kanfer & Marston, 1963b; Marston, 1964b).

Marston (1964a) noted that individuals categorized as task-oriented rather than self-oriented or interaction-oriented demonstrate increased frequency of corrected self-reinforcement over trials, presumably due to increasing confidence with the task. Marston and Cohen (1966) observed that self-critical behavior (incorrectly labeled negative reinforcement) was <u>not</u> related to intropunitive scores. In fact, moderate intropunitive scores were associated with more self-critical behavior than either high or low scores. They conclude that ". . . the tendency to be self-critical relates to a dimension that may be described better as ego strength than as intropunitiveness" (p. 243). They also report that individuals

who experienced a frustrating insoluble task following acquisition training on a verbal learning task were more self-critical during the self-control phase of the verbal learning task.

Bellack (1972) reported no significant difference, with regard to total self-reinforcement, between college students categorized as internals or externals on a locus of control measure. However, internals gave themselves more incorrect self-reinforcement and made fewer correct responses on a verbal discrimination task despite training to criterion identical to that of externals. H. V. Hall (1973) reported no differences between internals and externals on rate of self-reinforcement.

Characteristics of the Task, Reinforcer, or Situation

Characteristics of the task and the particular reinforcer also have demonstrated effects on self-control behavior. Masters and Christy (1974) reported that long tasks resulted in more self-reward, regardless of difficulty level. Kanfer and Marston (1963a) found that appropriate self-reinforcement was lower in frequency relative to inappropriate self-reinforcement when the test list differed from the acquisition list in a verbal learning task. Reschly (1973) and Reschly and Mittman (1973) reported that the greater the task ambiguity, the lower the self-reinforcement rate for seventh

graders. Liebert and Allen (1967) indicated that the more explicit the rule for self-reward, the less likely a child was to deviate from the rule when performing alone. They note that it is important to distinguish between acquisition of self-reward criteria and performance. Sufficient attention during training is essential for acquisition; other social variables like rule structure and reward magnitude affect performance. High incentive, operationalized as the most desirable category of reinforcement, was associated with more adherence to standards for self-reward (Liebert & Ora, 1968). The authors write that

> . . . this finding strengthens the view that the incidence of behaviors commonly taken as indexes of self-control may be partially determined by characteristics of the performance situation, rather than solely by prior training or the action of the hypothesized internal moral agents. (p. 543)

The importance of the performance situation is also observed in two studies examining self-monitoring accuracy. Epstein, Webster, and Miller (1975) reported that self-monitoring accuracy was decreased when subjects performed another concurrent operant behavior. They also reported that reinforcement for accurate self-monitoring could reduce error somewhat. Epstein, Miller, and Webster (1976) found errors doubled during self-monitoring of respiration when concurrent reinforcement for lever-pressing was included. They note

that it is important to assess the concurrent environmental demands when using self-monitoring as a treatment. Thus, the importance of investigations of self-control procedures outside the laboratory setting is clear.

Studies on Self-Control and Academic Performance

It is apparent from the foregoing discussion that a variety of variables including characteristics of the task, the reinforcer, the performance situation, the individual, and a model affect self-control behavior in addition to direct instruction and direct reinforcement. The differential ability of these and other variables to influence self-control behavior is strong evidence that such behavior is learned. Bem (1967) concludes from her work with 3- and 4-year-olds that verbal self-control is a developmental phenomenon, but one that is based on learning, not merely attaining a particular developmental level. Improved self-control is thus an attainable goal.

We will now return our attention to the specific self-control investigations on academic performance which seek to determine the relative strengths and weaknesses of the techniques of self-monitoring, self-reinforcement, and self-punishment. These studies, initially presented in Table 1 in Chapter I, will be reviewed in depth. Given that self-control can be learned, improved, and taught, the elucidation of the

relative strengths and weaknesses of the techniques is an important undertaking. The results of these studies on academic performance are particularly pertinent to the current investigations.

Self-monitoring

Several of the studies on academic performance included a self-monitoring condition. In a study comparing study skills advice, stimulus control techniques, and self-monitoring, Richards (1975) found that college students' study behaviors were significantly modified by self-control techniques and that self-monitoring was an effective addition to study skills advice, whereas, stimulus control was not. Significance was reached for an outcome measure of final exam grade, but not for final course grade. The self-monitoring treatment, which is more relevant to this discussion, consisted of monitoring daily the number of pages read and hours studied. Weekly record sheets were required as well as a cumulative graph for the 5-week treatment time. Self-monitoring groups increased their study time significantly during the experimental period, however, no comparison with other groups is possible. The self-monitored data were actually a part of the independent variable for these conditions.

Johnson and White (1971) also reported that self-monitoring study behavior increased academic performance

when college students were asked to observe, record, and graph their study activities using a point system for different activities. Course grades as of the sixth week were significantly higher for these students relative to students asked to monitor dating behavior and relative to a control group that did not monitor any behavior. Significant differences were not obtained for final course grade. Conclusions must be considered tentative with regard to this finding, however, because 80% of the class received a final grade of A and variability was much reduced compared with sixth-week grades.

Gottman and McFall (1972) obtained increases in the behavior selected for self-monitoring in their investigation of self-monitoring effects on the class participation of 17 high school students identified as potential dropouts. Subjects monitored either participating or not participating in discussion, after having been instructed to participate as usual. The behavior monitored increased and a cross-over effect was observed when the subjects' task was reversed.

The successful use of self-monitoring to reduce arithmetic errors was reported by Fink and Carnine (1975). They used an ABAB design with a group of 10 first graders alternating baseline with feedback about the correct score on arithmetic problems followed by a return to baseline. The second interaction included feedback

plus graphing scores. In only the latter intervention did scores differ significantly from baseline. These results must be considered tentative, however, due to the absence of a replication of the final intervention.

Broden, Hall, and Mitts (1971) reported successful results with self-monitoring in two different case studies. Lisa, an eighth grade student, monitored in class study time in history in a modified ABAB reversal design. Teacher praise was added to the third intervention after self-monitoring successfully enhanced study rate to approximately 80% over baseline of 27% in two reversals. Social reinforcement in the form of teacher praise brought study rate to 88%. With praise only, there was a slight decline to 77%. In addition to increased study time, Lisa's grade increased from a D- to a C and postchecks subsequent to the conclusion of the experiment indicated increased study rate was being maintained. This case study, as previously mentioned, also offered support for the hypothesis that the actual act of recording is not necessarily the active component of self-monitoring. Lisa often forgot to record her behavior in the latter intervention stages. Furthermore, although means of overall subject-observer records were similar, estimates of the percentage of study on a day-to-day basis showed little correlation.

Unlike Lisa's case, Stu, an eighth grade math student, monitored "talking out" behavior that was targeted for a decrease (Broden, Hall, & Mitts, 1971). Some reduction was accomplished but it was not as dramatic, nor as well maintained. No attempt was made to bring the behavior under social control by pairing with teacher praise and, as has been noted previously, the behavior selected for monitoring might best be the behavior to be increased. It is important to note that in Lisa's case, occasional praise from her counselor was confounded with the self-monitoring conditions. Furthermore, unlike Lisa, Stu did not himself seek assistance with his problem behavior, but was referred. These additional differences may help account for the conflicting results obtained.

Several other authors reported case study results obtained with self-monitoring. Maletzky (1974) reported that out-of-seat behavior was reduced by 80% for an 11-year-old girl with diagnosed behavioral problems. Fox (1966) reported successfully increasing the time a graduate student spent studying French through a combination of self-monitoring and self-contracting for increases. The results are inconclusive with regard to self-monitoring because this technique was used in combination with other techniques. Similarly, Goldiamond (1965) used a combination of self-monitoring and weekly

discussions about class notes, exams, and study behavior with a college student volunteer. Overall improvement in study time and grades was reported, however, the specific effects of self-monitoring cannot be assessed.

Case studies are often difficult to interpret conclusively because treatments often involve a combination of techniques. Furthermore, ABAB designs that permit modified treatments at each intervention and do not utilize adequate baseline periods are also inconclusive. Although the overall behavior improvement may occur, the functional relationship to experimental manipulation is difficult to establish. Such problems are not limited to case studies, however. They extend as well to studies using a modified ABAB design with a group and to group comparison designs in which inadequate control groups are present for comparison purposes.

Mahoney, Moore, Wade, and Moura (1973) reported an attempt at a more refined examination of the self-monitoring effect. They compared the effects of two types of self-monitoring on academic performance. They found continuous self-monitoring to be more effective than intermittent self-monitoring with reference to the length of time college students spent in review efforts for the Graduate Record Examination. They also found that self-monitoring affected accuracy on sample problems differentially, enhancing accuracy on mathematical

problems dramatically and demonstrating no effect on verbal accuracy. They discuss this interaction and suggest that "quantitative performance is much more sensitive to such modifiable factors as care given to calculations and so forth. Verbal tasks in the present study dealt mainly with the S's [subject's] vocabulary and conceptual abilities" (p. 68).

Unsuccessful applications of self-monitoring were reported in two studies. Bristol and Sloane (1974) compared the test performance of college students assigned to three groups--a control group, a second group that recorded and graphed study time, and a third group that participated in contingency contracting of study time in an ABAB design. All three groups earned $5.00 for graphing and recording study time for an initial 18-day baseline period. Subsequently, the controls were told that they had completed all the requirements for the experiment. Group II received instruction to continue recording and graphing. They received praise for turning in graphs and earned an additional $12.00 at the end of the quarter for having submitted all graphs. Group III had weekly meetings with the experimenter and earned up to $5.00 a week for submitting daily task cards with the weeks' required study time. They also received the $12.00 for continued monitoring and graphing activities.

No significant differences were found on test performance among the three groups. However, within the contracting group, the reversal procedure established that contracting significantly increased the reported study time of students. Furthermore, differential effects were obtained on test performance for Group III in which below-average students' test performance improved significantly. The authors conclude that "self-recording of study time in the absence of differential consequences did not improve test performance" (p. 271). It is important to note, however, that the three treatment groups received different amounts of monetary reinforcement. Conclusions about the relative effectiveness of self-monitoring in this instance must be tentative due to the presence of monetary reinforcement as a confounding variable.

Miller and Gimpl (1971) also reported unsuccessful results with self-monitoring in their comparison of self-monitoring, self-instruction, and external reinforcement. They assigned 23 college student volunteers to one of three conditions. All three conditions recorded their study time during the first week. During the second week all three groups followed a procedure whereby they would give themselves instructions three times a day to increase study time a specified amount. They continued recording as well. During the third week

the three groups received differential assignments. Group 1 returned to recording study time, Group 2 continued the self-instructions, and Group 3 received external reinforcement in the form of points earned toward their psychology course grade. Not surprisingly, Group 3 study time increased the most. Group 1 decreased somewhat and Group 2 increased somewhat. Thus, self-monitoring was least effective in this study, compared with self-instruction and with external reinforcement.

Self-monitoring and Self-reinforcement

Several studies reported the use of self-monitoring in combination with self-reinforcement. Ballard and Glynn (1975) used designs with multiple baseline across three writing behaviors for third graders. Assessments were made of the number of sentences written, the number of action words, and the number of describing words as well as time on task and an external evaluation of the writing. Self-monitoring procedures during baseline were supplemented with self-reinforcement in which the child earned points toward reinforcers for the specific writing behavior targeted for increase. Rates of responding, time on task, and external evaluations were all increased when self-reinforcement was added to self-monitoring.

Turkewitz, O'Leary, and Ironsmith (1975) reported the successful use of a combination of self-monitoring

and self-reinforcement in a 12-phase token program. Eight 7- to 11-year-old students were enrolled in a transitional adjustment class and were also behind one year or more in reading. The 12 conditions were baseline, goals, self-evaluation, tokens, matching 100%, matching 50%, matching 33 1/3%, no matching, fading backups 50%, fading backups 33 1/3%, fading backups 12 1/2%, no backups. During baseline, the childrens' progress in their readers was noted by one of the two teachers every 15 minutes. In the next phase goals were written on cards for each 15-minute interval and the cards were taped to the students' desks. In self-evaluation the children rated themselves on their goal cards every 15 minutes and could earn up to 5 points for their academic work and 5 points for their general behavior. Teachers also rated the children, but the ratings were not compared in this phase.

In the token period, the children did not rate their behavior. The teachers used the same scale as was employed in self-evaluation and wrote the points on the children's cards during three of the four 15-minute intervals. The other 15-minute intervals constituted a control period. During matching the children resumed self-evaluation and received bonus points for exact matches and loss of all points for discrepancies of more than 1 point. Matching was faded in four phases

by progressing from 100% to 50% to 33 1/3% to 0% of the class being selected to match the teacher. In no matching the children received whatever points they assigned themselves. Backup reinforcers were faded similarly with 50%, 33 1/3%, 12 1/2%, and 0% of the students being selected to exchange their points for backup reinforcers.

The authors were successful in reducing disruptive behavior with the introduction of the token phases and this reduction extended to the 15-minute control period. Low levels of disruptive behavior and a high degree of accuracy in rating were maintained, although some increase in disruptive behavior occurred during the no matching and no backup periods. The shaping and fading periods appear to have been effective in achieving a maintenance of the effects obtained during the token period. This study was unusually diligent in efforts to assure generalization and maintenance of behavior change. From a practical standpoint, replications of effects through return to baseline and reintervention were obviously undesirable. From a research perspective, caution must be used in interpreting the results and inferring functional relationships between behavior change and the self-monitoring and self-reinforcement techniques. The particular goals, in this study, of maintenance and generalization of behavior change, are in direct conflict

with obtain

strate func

The

replicated

O'Leary (19

monitoring

during an a

10-year-old

gram and ma

findings we

accurate se

reduction i

even after

inated. Th

the study a

different s

the finding

Gly

use of self

with a thir

had prior s

Using a mod

and self-de

on-task beh

mittent tap

signaled wh

with obtaining the fine discrimination needed to demonstrate functional relationships in an ABAB design.

The results reported by Turkewitz et al. (1975) replicated an earlier study by Drabman, Spitalnik, and O'Leary (1973) who reported the effective use of self-monitoring and self-reinforcement in a token program during an after-school remedial class for eight 9- to 10-year-old boys. The major components of the token program and matching and fading phases were the same. The findings were also similar--relatively honest and accurate self-evaluation was obtained as well as a reduction in disruptive behavior which was maintained even after all checking of self-evaluations was eliminated. The same concerns about replication within the study are present, however, similar results by two different studies offers some additional support for the findings.

Glynn and Thomas (1974) reported the successful use of self-monitoring and self-reinforcement techniques with a third grade classroom in which students had not had prior specific training with external reinforcement. Using a modified ABAB design, a period of self-monitoring and self-determined, self-administered reinforcement for on-task behavior followed an initial baseline. Intermittent tape-recorded signals varying from 1 to 5 minutes signaled when students were to record whether they were

on task. Each
time in an acti
were given duri

The 4-
the second inte
appeared to be
to be confused
task. A chart
the desired beh
and indicated t
teacher, stay i
of the chart sa
books, read ins
of self-monitor
resulted in a s
authors note th
with a change i
appeared to obs
factor. Result
reason and beca
undertaken.

The eff
forcement and s
investigated by
(1976). Volunt
study habits we

on task. Each check mark was worth 1 minute of free time in an activity room and between 10 and 12 signals were given during a lesson.

The 4- and 5-minute intervals were removed during the second intervention because the reinforcement ratio appeared to be too large. Furthermore, students appeared to be confused about what exactly constituted being on task. A chart with two colors was added to indicate the desired behavior. One-half of the chart was in red and indicated that the student was to "look at the teacher, stay in your seat, be quiet," the green half of the chart said "work at your place, write in your books, read instructions on the blackboard." The use of self-monitoring and self-reinforcement with cueing resulted in a significant increase in time on task. The authors note that the addition of cueing was confounded with a change in reinforcement ratio, however, it appeared to observers that the chart was the influential factor. Results must be interpreted cautiously for this reason and because no replication of the finding was undertaken.

The effects of information feedback, self-reinforcement and self-monitoring of study behavior was investigated by Richards, McReynolds, Holt, and Sexton (1976). Volunteer college students concerned about study habits were assigned to one of eight conditions--a

no treatme

six study

groups for

mation fee

for self-a

instructio

and instru

consequenc

alized as

day and re

student.

recording

lected wee

manipulat

ing. A m

monitorin

advice wh

R

mental gr

Uninforme

of study

reported

found the

their stu

time to t

experimen

no treatment control, a study skills advice group, and six study skills/self-monitoring groups. The latter six groups formed a 2 x 3 matrix in which high and low information feedback was crossed with three types of instruction for self-administered consequences--no instructions, instructions to self-administer covert consequences, and instructions to self-administer covert and overt consequences. High information feedback was operationalized as monitoring the exact number of pages read each day and recording this on cumulative graphs kept by the student. Low information feedback consisted of self-recording 0, 1-50, or over 50 pages read on graphs collected weekly. Exam grades showed that neither of these manipulations enhanced the effectiveness of self-monitoring. A main effect of treatment was obtained with self-monitoring/study skills groups superior to study skills advice which was superior to controls.

Richards et al. (1976) also collapsed the experimental groups into two categories--informed and uninformed. Uninformed students were those whose baseline estimates of study time were most discrepant from the times reported during the first week of the experiment. They found these students who had previously over-estimated their study time substantially increased their actual time to the level of informed students over the experimental period. The authors conclude that

"behaviorally uninformed students derived more benefit from self-monitoring than informed students" (p. 318). This finding seems reasonable, although no other study has reported such a comparison.

Also reasonable it seems are the findings on high-low feedback and the addition of self-administered consequences. Several authors have noted that reliability of self-recording is not essential to obtaining behavior change. Hence, fine-tuned manipulations of recording could be superfluous, if indeed they were accurate at all. Secondly, Richards et al. (1976) note that "self-administered consequences (e.g., covert self-reinforcement or self-punishment) may be implicitly involved in self-monitoring a valued behavior" (p. 36). To add covert consequences to the covert consequences of self-monitoring may not enhance the effect. To add overt consequences such as a tangible reinforcer has enhanced the effect of self-monitoring in some instances. However, there was no attempt to determine whether students actually followed instructions and conformed to this condition. The overall findings reported do give support to the effectiveness of self-monitoring, however, in this instance, self-reinforcement did not increase the effect.

Van Zoost and Jackson (1974) examined the effects of a combination of self-monitoring and self-reinforcement procedures added to a study skills course. The opportunity

to earn back $7.00 of a $10.00 deposit through completion of program activities was available to all students. Forty-three college students were assigned to one of three conditions in addition to the study skills class--self-monitoring and self-reinforcement of specified study activities, self-monitoring and self-reinforcement of specified library activities, and, self-reinforcement of self-monitoring. The self-reinforcement consisted of the opportunity to earn up to 75¢ for every two weeks for eight weeks for the point activities on the cards. This enabled experimental subjects to earn up to $10.00 of their deposit back. Controls were paid $3.00 for completing final tests and questionnaires in addition to the $7.00 for class participation.

The authors reported no significant differences among groups on the Study Habits score of the SSHA and add that "monitoring study behaviors did not improve reported study habits relative to recording other behaviors or not recording at all" (p. 217). However, they did report significant gains for all three groups on the Study Habits score. They conclude that "the effectiveness of self-administered reinforcement in altering and sustaining complex behaviors overtime has again been demonstrated" (p. 217). An adequate control group was not present to permit such a conclusion about self-reinforcement which is confounded with the study

skills course. One of the conceptualizations of self-reinforcement utilized in this study--self-reinforcement of an ineffective self-monitoring behavior--and the incomparability among the three groups with regard to how the $10 deposit was potentially regained contributes further to the difficulty of interpreting the results obtained.

McReynolds and Church (1973) compared the Work Methods and Study Habits scores on the SSHA for 39 college student volunteers who met the requirement of a low grade point average and a reduced load. Students were assigned to a study skills group; a self-contracting group utilizing self-monitoring, self-reinforcement, and self-contracts; and a no treatment group. Students in a regularly offered Counseling Center course on reading speed, comprehension and vocabulary were also used for comparison purposes. The authors report significantly higher scores on the two scales for students in the study skills class and the self-contracting group. The results were equivocal for grades, with significant gains in grade points obtained by these two groups, but, no significant differences among the groups in grade point average.

Two case studies also reported the effective use of self-monitoring and self-reinforcement. Wasserman, Brown, and Reschly (1974) taught self-management

techniques to two hyperactive children assigned to an emotionally disturbed class. Dramatic changes in the target behaviors of Ricky and Andy were obtained when self-monitoring and self-reinforcement procedures were applied. Ricky earned 10 minutes of free time for completing all arithmetic assignments. Andy earned 1 minute of free time for each 10-minute interval in which he recorded no tantrum behavior. If there were no outbursts in the entire 90-minute recording period he earned 10 minutes of free time. The results were so successful that after six weeks, the children were earning the privilege of a half day in the regular classroom, which was a powerful reinforcer for them. After a short period they reentered the regular class permanently on a part-time basis. The authors note that "for a two-year period prior to intervention neither child had been in anything other than a special education classroom environment" (p. 23). Again, from a research standpoint the absence of a replication of the effects necessitates caution in interpreting these results.

In another case study utilizing a college student, Whitman and Dussault (1976) reported the application of self-monitoring and self-reinforcement techniques in a token economy with an ABAB design. Simultaneous modification of 30 different behaviors was attempted. Point values were established for achievements (earnings) and

for reinforcers (expenditures). The token period required close monitoring of the behaviors and reinforcers were now contingent. The most important behaviors under modification were academic behaviors including a specified number of hours a week of study time, 100% class participation, and 100% class attendance. The reinforcer was time with a girlfriend. A marked improvement was obtained during the two token periods and a reversal did occur during the second baseline, although the behaviors did not return completely to the level of baseline I. Interestingly, examination of the graphs indicates that reinforcement expenditures remained about the same across the four phases, however, targeted behavior increases were obtained when these freely available reinforcers were made contingent upon the target behaviors.

Self-reinforcement

On the whole, self-monitoring effects have been reported, although, the addition of reinforcement has increased the effect in some cases. This finding is not unlike that observed in the self-control literature in general. Similarly, self-reinforcement techniques used in self-control literature examining academic performance and study behavior, have been shown to be equal to external reinforcement, thus paralleling findings

reported for the field in general. Glynn, Thomas, and Shee (1973) concluded that self-determination of reinforcement was effective in maintaining high rates of on-task behavior previously established and maintained with external reinforcement in a second-grade classroom. Similar results were reported by Felixbrod and O'Leary (1973) who demonstrated with second graders that self-determined contingencies and externally determined contingencies were equally effective relative to controls in enhancing time on task and number of correct solutions.

Felixbrod and O'Leary (1974) replicated their 1973 findings in this study using third graders, however, they did not obtain significant differences among the three experimental conditions with regard to behavior in an extinction phase for either time on task or number of correct solutions. With the removal of contingent reinforcement, all children spent less time in the task setting. The authors noted a tendency, however, though not significant, for students in the externally imposed condition to spend more time on the task during extinction.

Speidel (1974) found contingent self-reward and experimenter reward in the form of television viewing to be equally effective and more effective relative to controls in increasing the number of arithmetic problems completed by college students. Lovitt and Curtiss (1969) found, in two experiments, that self-imposed contingencies

were more effective in increasing academic response rate in a 12-year-old student with diagnosed behavior disorders. Results of a third experiment indicated that reinforcement magnitude was not a factor. Even when the teacher specified reinforcement rates were set at the same level as that of the student specified rates in Experiment II academic response rate did not increase as it did under student specified periods.

Glynn (1970) compared the test performance of 128 9th grade girls under conditions of experimenter-determined, self-determined, random, and no reinforcement. These conditions were preceded and followed by baseline conditions. In the final phase all students were under self-determined reinforcement. Glynn reported that self-determined reinforcement was as effective as externally determined and that both resulted in significantly improved test performance over the entire program relative to the random and no reinforcement groups. Given the repeated demonstrations that self-reinforcement patterns are often similar to the reinforcement patterns experienced under external reinforcement, Glynn makes some interesting observations about the students in the chance reinforced conditions. These students generally performed at a level below that of the nonreinforced control.

> The inconsistent experience of this class in terms of amount of reinforcement during the Token I phase, seems to have not only precluded performance increments during this phase, but also to have prevented subsequent self-determined procedures (which followed in Token phase II) from having any incremental effect. This is certainly an indication that the ability to apply self-determined reinforcement is strongly influenced by the standards of externally determined reinforcement previously experienced. Hence, inconsistency of reinforcement can occur not only in terms of interspersing reinforcement with non-reinforcement as consequences of a given behavior, but also in terms of unpredictable amounts of reinforcement for a given behavior. These results suggest that parents and teachers, who function as major external reinforcing agents for children's behavior, should be aware that one consequence of maintaining such inconsistent standards of reinforcement may be impairment of the child's ability to apply self-determined reinforcement procedures effectively. If such an ability is considered as one component of self-control, as Marston and Kanfer (1963) suggest, then inconsistent experiences of amount of reinforcement would have a debilitating effect on the development of an individual's ability to control his own behavior. (p. 131)

It is important to recognize that the haphazard and unsystematic approach to reinforcement which many well-meaning individuals identify with freedom of the individual can result in diminished ability for self-control and self-determination.

Jackson and Van Zoost (1972) assigned 47 college students in Experiment 1 and 35 college students in Experiment 2 to one of four conditions--self-administered reinforcement, external reinforcement, no reinforcement, and no treatment control. The three reinforcement conditions varied by the way in which students could earn

back a required $10 deposit. Members in external reinforcement received money for completing the exercises in each session and the group leader evaluated their answers and paid them according to preannounced monetary value. They also earned 50¢ for attending each of six sessions and $1 at the end of the experimental period for completing the questionnaire. Students in the self-administered reinforcement condition received the same amounts of money for attendance and completing the questionnaires. These students, however, evaluated their own performance on the exercises and self-administered monetary reinforcement up to a maximum set by the group leader. The no reinforcement condition received 50¢ for attending each session and $7 at the end of the program after completing the questionnaire.

The authors reported that no significant differences in grade point average were obtained in either experiment. The SSHA Work Methods score did improve significantly for external and self-administered reinforcement groups in Experiment 1. In Experiment 2, all three experimental conditions improved their Work Methods score. This consistency can be accounted for, in part, by the fact that the "no reinforcement" condition included monetary reinforcement, equal to that of the other conditions in terms of total amount of money received. In fact, the probability for receiving the

entire $10 deposit was probably higher under "no reinforcement" than under external reinforcement, in which the group leader assigned monetary value to performance on weekly exercises.

In yet another investigation, Jackson and Van Zoost (1974) compared the study habits scores of those college students assigned to an experimental condition requiring that they self-assess and self-reward their teaching a study skill program in which they were enrolled to a friend or sibling. The teaching groups were superior in subsequent study habit assessment to nonteaching controls, indicating the effectiveness of the combination of self-reinforcement of their teaching behavior. No conclusions can be drawn about the unique effects of self-reinforcement because appropriate control groups were not included.

Self-reinforcement and Self-punishment

In another study using a combination of self-control techniques, Harris and Trujillo (1975) reported that instruction in self-management which included teaching the principles of stimulus control, self-monitoring, reinforcement, punishment and various study skills led to improvement in grade point averages for junior high students compared with a no-treatment control. They also reported that group discussions on study problems

were effective. This study is one of only three investigations of self-control techniques and academic performance that included reference to self-punishment.

Beneke and Harris (1972) taught a self-control procedure for modifying study behavior to college students which consisted of stimulus control procedures, self-reinforcement and punishment, and a study method, the SQ3R, outlined by Robinson (1970). Two instructional formats were used--written instruction and group discussion. The combination of techniques resulted in a significant gain in grade point average for three semesters following the program in comparison with two semesters prior to the program for both experimental groups relative to controls. The control group, however, consisted of 15 subjects who chose to drop out of the program after the first meeting, thus their comparability is in serious doubt. Beneke and Harris introduced subjects to punishment

> . . . as an option for dealing with behavior incompatible with studying. Suggested types of punishment included fines, denying oneself a pleasant activity, performing good-for-you-but-unpleasant activities (calisthenics, housework, etc.), and asking a friend or spouse for criticism. (p. 37)

Kaufman and O'Leary (1972) also included a self-punishment component in their token program to reduce disruptive behavior and increase reading skills of 16 adolescent pupils in a psychiatric hospital school.

The program consisted of six phases--baseline, Token I with teacher reinforcement/punishment for appropriate behavior, baseline, Token II--reinstate Token I, Token III--modify Token I by changing classroom location, and, self-evaluation and self-reinforcement/ punishment. Reductions in disruptive behaviors were obtained with the onset of the Token periods and throughout the final phase. Furthermore, increased amounts of work were accomplished during the less disruptive token periods.

The class had been divided in half, initially, and one of two procedures used during the token periods. Students either earned up to 10 tokens during 3 of 4 15-minute periods or they lost up to 10 tokens which had been given to them at the beginning of a session. The number of tokens earned or lost by children displaying similar behavior patterns was held constant. These same reward-cost procedures were used during the self-control phase as well. There were no differences in the two groups during any of the token phases in level of disruptive behavior or amount of work.

The authors observed that "the failure to find differences between the effectiveness of Reward and Cost procedures may be due to the fact that the procedures were equally effective or the procedures were not really different" (p. 307, emphasis mine). This study was one

of only three investigations of academic performance that use self-punishment and is the only study to discuss the essentially reciprocal nature of reward-cost procedures.

> One may argue, however, that since ultimately both reward and cost pupils obtained the same number of tokens for the identical behavior, irrespective of the class procedure, and that the amount always exceeded the number of tokens before class, then both procedures were in reality, Reward procedures.
>
> On the other hand, the Reward procedure may have contained certain elements that one would ordinarily associate with cost. Due to the potency of the token programs, there was very little disruptive behavior. Consequently, the teacher usually gave the maximum number of tokens during a rating (e.g., 10). . . . A less-than-maximum rating, therefore, by its sheer infrequency may be looked upon as loss, i.e., a cost. (Kaufman & O'Leary, 1972, p. 307)

This integral relationship between reward and cost can also be observed with regard to each behavior. In the reward condition, reward is in effect for appropriate behaviors--a token is retained or received. Simultaneously, punishment is in effect for inappropriate behaviors--a token is either removed or not received. Withholding reinforcement is a type of punishment. Hence, the reciprocal relationship is aptly portrayed.

The Present Investigation

Logical and Theoretical Continuity

It seems apparent from the foregoing discussion that self-control techniques have been successfully

applied to study behavior and academic performance. It is also apparent that such investigations vary on many dimensions. The subjects may be elementary, secondary, college, or adult groups, and, the designs may be group or case study investigations. The dependent variables may be grades, test performance, study time estimates, class participation, among others. The independent variables are also wide-ranging and include not only self-monitoring, self-reinforcement, self-punishment, but also, other self-control techniques such as stimulus control.

Furthermore, the methods of operationalizing these independent variables vary considerably. Self-monitoring may include a daily log, charts, and graphs. Self-reinforcement can be food, money, positive self-evaluation, self-administered activity reinforcers such as coffee with friends, trips, breaks, and television. Self-punishment consists of fines, unpleasant activities, or the loss of any of the foregoing reinforcers. The studies also vary in what they investigate and compare--self-monitoring versus self-reinforcement, self-monitoring versus no-treatment control, and so on. Finally, the results vary.

Trends do appear in the data, however. The results appear to correspond, within this subset of investigations, to those described in the foregoing

general discussion of self-monitoring, self-reinforcement, and self-punishment effects. As McLaughlin (1976) has observed in a recent review, "a clear majority of the research reviewed has shown that self-control procedures can be implemented in public and remedial classrooms" (p. 654). Specifically, effects have been obtained with self-monitoring and self-reinforcement, and, furthermore, self-reinforcement has been found generally to be equivalent to external reinforcement in effecting behavior change. Studies reportedly utilizing self-punishment have been correspondingly few in number, however, discussion on the interrelatedness of self-reinforcement and self-punishment techniques has been reiterated with regard to studies on academic performance.

As noted earlier, the effects obtained with self-monitoring can be explained as effects from a covert self-reinforcement/punishment procedure. From a practical standpoint, self-monitoring contingencies (with presumed covert self-reinforcement and self-punishment) can be distinguished from procedures using overt self-reinforcement and self-punishment techniques. McLaughlin (1976) has observed that no classroom research has yet undertaken to isolate the effects of self-monitoring compared with other self-control techniques (p. 653).

Within the larger field of self-control Kazdin (1974b) has stated that the unambiguous demonstration

of the efficacy of self-monitoring is more important than theoretical interpretations of the phenomenon (p. 246).

Kanfer (1970) has noted that

> . . . from the standpoint of theory, the investigation of self-monitoring in the context of self-regulatory process, promises to add significantly to our understanding of a critical human characteristic, the capacity to adjust one's own behavior without continued dependence on environmental control. (p. 151)

Jeffrey (1974) writes

> . . . a feasible strategy to isolate the effects of self-monitoring is to use an experimental design that separates the relative contribution of self-monitoring from other aspects of the treatment. A between-subjects group design with a no-treatment control group, a self-monitoring group only and a self-monitoring-plus-some-treatment group could be used to isolate the relative effectiveness of self-monitoring to behavior changes. (p. 183)

This is the same comparison Thoreson and Mahoney called for (1974, p. 34) and precisely the comparison which was employed in the present investigation.

The Specific Comparisons

The present study was designed to provide information on the relative effectiveness of two self-control procedures. The self-controlling responses (SCRs) constituted the independent variable and three levels were present--self-monitoring (SM), self-monitoring plus a combination of self-reinforcement and self-punishment (SM+C), and a no-treatment control (C). As noted previously, the comparison is called for from a

theoretical standpoint. Thus far the effects of self-monitoring have not been isolated.

Different instructions to the subjects comprised the operational definitions of the levels of the independent variable. The operational definitions utilized in this study were selected carefully. Self-monitoring was operationalized as the daily tallying, recording, and graphing of study time for a designated course. This is a fairly common operational definition for self-monitoring. Self-reinforcement and self-punishment were operationalized as positive and negative self-ratings. The interrelated nature of self-reinforcement and self-punishment is apparent in this particular operational definition. Clearly, these overt consequences appear to come very close to the presumed covert consequences which contribute to the self-monitoring effect. The goal in this operational definition was to make such positive and negative self-evaluative statements overt and explicit in one condition and to thereby permit a comparison of overt and covert techniques as well as self-monitoring and self-reinforcement/punishment process. Tangible self-reinforcers were considered but rejected in an effort to closely approximate hypothesized internalized reinforcement-punishment process.

The use of self-ratings or combination reinforcement/punishment conditions is quite common, though not as common as the use of tangible consequences. In a

study comparing self-reward and self-criticism, Kanfer and Duerfeldt (1968) recount that the external use of evaluative responses like "good" or "correct," or symbolic nonvocal equivalents have been shown repeatedly to have reinforcing effects. They suggest that the results of their investigation indicate that "similar stimuli delivered by the subject following his own performance may have parallel reinforcing effects" (p. 267). Kanfer, Duerfeldt, and LePage (1969) observe that the facilitative effects of self-judgments have been demonstrated. They assume that the self-judgmental response has both informational and incentive characteristics. Bandura (1974a) has observed that self-administered consequences are often material, however, he expects this to change.

> Eventually changes in form, as well as source, of reinforcement will appear as the insufficiency of material outcomes is acknowledged. Most people value their self-respect above commodities. They rely extensively on their own self-demands and self-approval as guides for conduct. To ignore the influential role of covert self-reinforcement in the regulation of behavior is to disavow a uniquely human capacity of man. (p. 863)

Through the use of symbolic reinforcers, this study attempted to better examine the self-monitoring effect. In addition, it attempted to address a methodological criticism noted by McLaughlin (1976).

> Another methodological issue that plagues most of the research reviewed [on self-control in the classroom] has to do with subject selection bias,

> that is, subjects who were selected for the study represent an extreme sample of all possible samples. (p. 656)

This bias was noted in Chapter I with regard to the studies conducted with college students' academic performance. Generally students in such investigations were ones who either volunteered for a course or activity to assist them with study behavior or were selected because of a history of academic difficulty. The remainder were typically introductory psychology students.

The random assignment of such students to conditions enables accurate comparisons to be made about the techniques, however, the resulting generalizations are made appropriately only to the populations from which these students were a sample. It is quite plausible that self-control techniques are more suitable for certain groups. One study reported that self-control techniques were more effective for students who were below average on a previous classroom test (Bristol & Sloane, 1974) and another study noted that students who were relatively uninformed about their study habits improved the most when self-control techniques were used (Richards, et al., 1976). Thus, a broader base was sought for the present investigation. Subjects were obtained from two lower division classes--chemistry and calculus--for two independent replications of the experimental manipulations.

It is apparent that the present investigation addressed an issue of theoretical importance and furthermore undertook to do so with consideration of the issue of generalizability. In the next chapter the specific hypotheses under investigation will be described as well as the experimental design and the specific dependent variables. The subjects, materials, and procedures will be described in much more detail.

CHAPTER III

METHODS

Hypotheses

Three hypotheses were investigated in this study.

Hypothesis 1:

> Students in the experimental conditions (SM and SM+C) will demonstrate superior test performance relative to controls. That is, students who either self-monitor or self-monitor and administer self-reinforcement and self-punishment in the form of an overt self-rating will have higher test scores than control subjects.

Thus, it is expected that the present study will replicate other studies that report that the use of such self-control techniques enhances academic performance.

Hypothesis 2:

> Students in the SM+C condition will demonstrate higher test performance than students in the SM conditions.

This effect is expected as a result of the observed trend in the literature indicating that the addition of overt self-reinforcement to self-monitoring enhances the self-monitoring effect.

Hypothesis 3:

Students in the SM+C condition will report higher mean study time compared to students in the SM condition.

Design

The experimental design used to investigate these hypotheses included three conditions--self-monitoring (SM), self-monitoring plus a combination of self-reinforcement and self-punishment (SM+C), and control (C). The same design was used in two different classes constituting two identical independent experiments. A sketch of the design in Table 2 includes the number of subjects in each condition.

Table 2

Experimental Design and Number of Subjects by Experimental Condition and Class

Condition		Experiment 1	Experiment 2	Total
		Chemistry	Calculus	
1	SM	46	28	74
2	SM+C	52	25	77
3	Control	51	27	78
	Total	149	80	229

Dependent Variables

The primary dependent variable was the second midterm examination scheduled in each class and a value

for this dependent variable was obtained for subjects in all three conditions. (See Appendices A and B for second midterm examinations.) In addition, daily reported study time was obtained from subjects in the two experimental conditions as a result of the presence of the independent variable requiring self-monitoring. Finally, a questionnaire was administered to subjects in the two experimental conditions to obtain feedback on the experiment and to assess the subjects' degree of conformity to instructions.

Subjects

The subjects were 229 students in two classes--an introductory chemistry class, Science 3A, and a second-quarter calculus class, Math 1B, at the University of California, San Diego. In chemistry, 151 students participated in the three-week project out of 197 for a participation rate of 77%. (Initial course enrollment was 239; 42 students dropped.) In calculus, 81 students participated out of 102 for a 79% participation rate. (Initial course enrollment was 113; 11 students dropped.) In total, 232 students participated out of 299 for a 77.6% overall participation rate.

Three of the 232 students were excluded from the data analysis because they were missing a score on the first midterm examination which served as a covariate. (See Appendices C and D for the first midterm examination.) Additional covariates which were recorded were Scholastic

Aptitude Test (SAT) Verbal and Mathematics aptitude scores as well as evaluated high school grade point average.

The subjects in chemistry were 56% male and 43% female which includes a slightly higher percentage of males than the overall UCSD average of 52% male, 47% female. The subjects in calculus, however, were 37% male and 63% female. The higher percentage of females is accounted for, in part, by the existence of two calculus sequences at UCSD. One sequence, Math 2, is designed for those who intend to major in one of the physical sciences. The other math sequence, Math 1, is for those who will fill their year-long mathematics requirement with a calculus sequence, but do not intend to major in the physical sciences. Typically, women are underrepresented in the physical sciences accounting for their overrepresentation in the Math 1 sequence. Other possibilities exist for meeting the mathematics requirement, depending upon the student's college and major, including a pre-calculus sequence, a beginning statistics sequence, and a computer science sequence. Thus, students in the Math 1B course are in the second quarter of a mid-level difficulty sequence.

The subjects in both classes were approximately 70% freshmen and 20% sophomores. The classes are

considered to be lower division courses, however, a few upper classmen were enrolled.

Materials

Considerable time and attention were devoted to the development of the seven forms, which constituted the operationalization of the independent variable, and to the development of two versions of a questionnaire that served as a dependent measure of the degree of conformity to condition. All forms are described below.

Cover Letter

A standard cover letter was used for all three experimental conditions (see Appendix E). In the cover letter the students were asked to participate in a research project being conducted by the Office of Academic Support and Instructional Services (OASIS) at UCSD. They were told that the project would require them to provide information on a weekly basis for three weeks. They were asked not to discuss their particular project with other class members, who would have different projects, to assure that the information they provided would reflect solely their point of view. Second, students were referred to an instruction sheet which outlined their particular project. The instructions were intended to be self-explanatory. They were told, however, should any questions arise, they were to call the experimenter

in her office in OASIS, or see her before or after class. Third, the cover letter explained that the information they provided would be confidential and that code numbers would be used on all materials to prevent identification of the student. They were assured that their professor would not receive information about their participation although he would receive summary information about the class as a whole. They were informed, as well, that their participation would have no effect on their grade. The cover letter was used, also, to inform students that each week they returned their OASIS project a token would be placed in a large jar and they would earn a chance on a $50 prize. In order to be eligible for the drawing, the student must have participated for all three weeks of the project.

An addendum to the cover letter was added indicating that a 90% return rate for the entire class was essential to the project's success, otherwise, it would have to be repeated. If the return rate was not high enough, the drawing would be held in another class spring quarter when the project was repeated. This addendum was added to encourage participation. This probably facilitated the 77% return rate.

Instruction Sheet

The instruction sheet constituted page two of the packet and it existed in three forms:

1. Self-monitoring. Instructions to students in this condition specified that they were to log and graph on a daily basis the amount of study time they spent each day on their class, excluding time in class. A sample of a week's log and graph was included (see Appendix F).

2. Self-monitoring + self-rating. In this condition students were instructed to log and graph on a daily basis the amount of study time they spent each day on the class, excluding time in class. Additionally, they were to record a self-rating of the amount of time they spent on the class. They were to record a plus (+) whenever they regarded the amount of time to be adequate and a minus (-) when it was inadequate. This self-rating was to be based on their own opinion of adequate study time (see Appendix G).

3. Control. Students in this condition were given a task irrelevant to the present investigation. They were asked to describe in a few sentences nonclassroom experiences they judged to be equal to or greater in importance compared with their course work (see Appendix H).

Report Forms

Report forms existed in three formats as well. They had in common a small token in the lower right-hand corner that contained the student's code number. In addition to the student's code number, the report form number (1, 2, 3), and, the due date were written at the top of the form.

1. Self-monitoring. This form consisted of a blank graph with the seven days of the week on the abscissa and 250 minutes or 6 hours on the ordinate. A row of seven boxes under the days of the week was used for logging daily study time in minutes. Three copies were included in each packet (see Appendix I).

2. Self-monitoring + self-rating. This form was identical to the form above with the addition of seven boxes for self-ratings. Three copies were included in each packet (see Appendix J).

3. Control. This form was blank except for the identifying information and the token. Three copies were included in each packet (see Appendix K).

Questionnaire

Two forms of the questionnaire were utilized. Control subjects did not receive questionnaires.

1. Self-monitoring. This 13-item questionnaire included 9 items designed to assess the degree of conformity to condition; that is, it assessed the degree to which the subjects in the condition reported that they adhered to the instructions. In addition, 3 items asked whether the student thought the project had an effect on study time, whether he/she would continue graphing study time for this class, and whether he/she would use graphing in other classes. The 13th question was open-ended and sought feedback on the project (see Appendix L).

2. Self-monitoring + self-rating. This questionnaire contained 4 additional items intended to assess conformity to condition with regard to self-rating. All other items were identical to the self-monitoring questionnaire previously described (see Appendix M).

Thus, each student received a packet of materials containing a cover letter, an instruction page, and three report forms. Questionnaires were distributed on the last day of the project to the students in the two experimental conditions.

Procedures

Procedures will be discussed in two main categories--project development and project implementation.

Project Development and Pilot Study

Development began in fall, 1976, when agreements were reached with the faculty in calculus and chemistry to use their courses between the third and sixth week of the Winter Quarter, 1977, for implementation of this research project. Initial discussions were held in November and the two faculty members involved were provided with copies of the research proposal.

Concurrently, further development of the forms was undertaken. Fourteen UCSD students and three junior high students participated in a two-week pilot test of the self-monitoring and self-monitoring plus rating forms to determine whether the instructions were self-explanatory, whether the accompanying graphs were clear, and whether the questionnaire was readily understood. Modification of all forms was made as a result of this pilot review.

Following the review, an artist was contracted to design the graph forms in a most visually appealing and functional manner. The same artist's rendering was used to produce the photographic reduction for both types of graphs, insuring identical materials. The

only difference between the two graphs was the row of boxes for self-rating.

Project Implementation

Project implementation began in the second week of winter quarter with the fourth class meeting. For three consecutive class meetings the experimenter circulated blank class rosters at the lectures in an attempt to build an accurate class roster and to obtain current addresses and telephone numbers for all students in each class. Sign-up sheets were alphabetized and compared with the official class rosters as of the second week of the quarter when the period for late enrollment ended. Discrepancies were resolved by the experimenter in favor of the "unofficial" class roster.

Few students questioned the circulation of class rosters because it is widely known that class lists are not completely accurate. The experimenter did explain the need for the rosters subsequently when a brief announcement was made in the lecture immediately preceding the first exam. The experimenter announced that an OASIS research project would begin following the first exam and that materials would be distributed to students at the exam. It was, thus, necessary to have a complete and accurate class roster. In the announcement which took less than two minutes, the experimenter outlined the information in the cover letter and

highlighted the $50 drawing. The drawing was humorously received and students appeared to look forward to the project.

The rosters were used to randomly assign students to one of the three conditions. Once students were assigned to the conditions, they were assigned code numbers which were recorded on a master log.

The code numbers were written on the three report forms in each packet as well as the number of the form (1, 2, or 3) and the day and date due in class. Code numbers were written in the token as well. Large manila envelopes were prepared with the student's name printed in two-inch letters across the envelope. This arrangement was necessary to permit distribution to the particular student the materials for his/her assigned condition.

These manila envelopes were arranged in alphabetical order on the sidewalk outside of the lecture hall for chemistry and large alphabetical letters directed the student to the area where he/she would find a packet. Students picked up their packets as they entered or left the exam. Four additional OASIS staff were present to assure an orderly distribution to the students. The few students who did not pick up a packet received theirs in the mail within 48 hours. About 20% of the class were assigned to take the exam in another location to permit alternate seating in the

large lecture hall. Identical distribution procedures were handled by one staff member in this location.

Distribution procedures for calculus were the same except that packets were arranged at the front of the class inside the exam. This was a much smaller class and distribution problems were lessened. Only the experimenter and one other staff member were required.

Weekly contact was maintained with the faculty throughout the project. In addition, they were provided, in advance, a calendar listing the specific activities that would be undertaken in each class period. Every effort was made to avoid any infringement on class time. Thus, materials were distributed or collected before and after class. The experimenter was available throughout the project at each lecture meeting of both classes to answer any questions. (This required about 7.5 hours of time a week in class.) The only use of class time was the initial announcement and the $50 drawing at the project end. Total class time used was under five minutes.

In addition to attending every lecture for three weeks--taking care to arrive early and remain late--the experimenter wrote announcements on the chalkboard at every session. Announcements included the beginning date and due date of the week's project, compliments on excellent participation rate, and during the final week, an announcement about the $50 drawing date. Thus,

reminders were present in each lecture through the messages on the chalkboard, the experimenter's presence, and the presence of a large three-quart jar decorated with a $50 insignia and filled with increasing numbers of tokens.

The project began on Monday, January 31 for both classes. Materials were distributed to chemistry students at their exam on Friday, January 28, and to calculus students at their exam on Monday, January 31. The first weekly collection was Monday, February 7. The experimenter and one other staff member set up a card table, a large sign, and the jar. Armed with scissors, the tokens were clipped into the jar as students turned in their form on the way into the lecture. Students who indicated they forgot their forms were told they could bring them to the next lecture. They were quite apologetic.

At the end of the first collection, all the forms were ordered by code number. That evening they were logged. A telephone follow-up was conducted the following day for all students who did not turn in a form. Students were generally quite appreciative of the phone reminder. Students without phones received notes in the mail within 24 hours.

The same collection procedures were followed for the second collection date on Monday, February 14.

The telephone follow-up was limited to those students who participated the first week by returning project #1.

The third and final collection was made on the day of the class's second exam. In chemistry this was Friday, February 18. Data for this third week were only available for five of the seven days in this class. In calculus the second exam was Wednesday, February 23. Project #3 ended for these students on Sunday, February 20, however, no class was held Monday, February 21 because of a University holiday. They returned project #3 at their second exam.

In addition to collecting project #3 at the second exam, questionnaires were distributed to students in the two experimental conditions. The same distribution methods were used as for the distribution of packets. Collection, however, immediately followed the exam. Some students returned their questionnaires at the next lecture period as did some who forgot to bring project #3 to the exam.

The $50 drawing was conducted in both classes on Monday, February 28. Students had been told that they must participate for the entire three-week period to be eligible for the drawing so it was essential that the roster be completely accurate prior to the drawing. The students also knew they had to be in class to win.

One token was drawn in each class, the student's name was read from the log of code numbers, and a $50 check was given to the student.

CHAPTER IV

RESULTS

Academic Performance

Analysis of covariance was used to analyze the scores obtained on the primary dependent variable, midterm II, in both Experiment 1 (chemistry) and Experiment 2 (calculus). Midterm I was used as the covariate in both analyses. In Experiment 1 the correlation for midterm I and the dependent variable was .660, the multiple R^2 was .435, and F (1, 145) = 11.63, $p < .0001$. In Experiment 2, midterm I and the dependent variable correlated .618, with a multiple R^2 of .381, and F (1, 76) = 46.86, $p < .0001$. SAT scores and evaluated high school grade point average (gpa) were not included as covariates in the final analysis because they did not add significantly to the variance accounted for by the use of midterm I alone.

The decision to exclude SAT scores and gpa as covariates was made in a prior stepwise regression analysis. In Experiment 1 (chemistry), the stepwise regression probability levels were .0001 for the

contribution of midterm I as a covariate, and .644, .668, and .072 for SAT-Verbal, SAT-Math, and evaluated high school gpa, respectively. Midterm I account for 41.37% for the variance and the three additional covariates added only 1.47%.

In Experiment 2 (calculus), the probability levels from the stepwise regression analysis were .0001 for the contribution of midterm I as a covariate, and .226, .518, and .415 for the addition of SAT-Verbal, SAT-Math, and evaluated high school gpa, respectively. Midterm I accounted for 48.04% of the variance and the three additional covariates added only .52%.

Two orthogonal contrasts, based on Hypotheses 1 and 2, were examined in each experiment. The contrast associated with Hypothesis 1 is a comparison of the test performance of students in the two experimental conditions combined (SM and SM+C) with that of the controls. The contrast associated with Hypothesis 2 is a comparison of the test performance of students in the two experimental conditions with each other. Table 3 includes the estimates of the contrasts and associated standard errors which are discussed further in the results reported for each experiment. It is important to note that the contrast for Hypothesis 1 considered the control group first and the contrast for Hypothesis 2 considered the SM+C condition first to give meaning to the signs of the contrasts.

Table 3

Least Squares Estimate of the Contrast and Standard Error by Hypothesis and Experiment

	Experiment 1			Experiment 2		
	Contrast	s.e.	n	Contrast	s.e.	n
Hypothesis 1	-4.59	2.30	149	1.97	3.52	80
Hypothesis 2	-2.61	2.72	98	3.29	4.11	53

Experiment 1--Chemistry

It was predicted in Hypothesis 1 that students in the two experimental conditions (SM and SM+C) would demonstrate superior test performance relative to controls, replicating earlier findings that the use of self-control techniques enhanced academic performance. A significant difference was obtained for midterm II when students' test performance in the experimental conditions was compared with that of the controls, F (1, 145) = 3.85, $p < .052$, using the adjusted means from the ANCOVA. The least squares estimate of the contrast was -4.59 with a standard error of 2.30. The confidence interval is -4.59 ± 4.51.

The estimate of the adjusted effect, -4.59, and its sign indicates the size and direction of the differences between the experimental groups and the controls on midterm II. The test scores for the experimental conditions were 4.59 points higher on the average when

compared with controls. The conditional standard deviation for midterm II in chemistry was 13.30, therefore, the estimated 4.59 point difference between the groups is equivalent to one-third of a standard deviation (.35 to be exact).

With regard to Hypothesis 2, it was predicted that students assigned to the SM+C condition, requiring both self-monitoring and self-rating, would evidence higher test performance than students in the SM condition who simply monitored their study time. No significant difference was obtained for midterm II when students in the two experimental conditions were compared, F (1, 145) = .928, $p < .337$, using adjusted means. The least squares estimate of the contrast was -2.61 with a standard error of 2.72. The confidence interval is -2.61 ± 5.32.

The estimate of the effect and its sign, -2.61, indicate that the size of the difference between the two experimental conditions is small relative to its standard error and that the students' performance in the SM condition averaged about 2.6 points higher than that of students in the SM+C condition. The 2.6 point difference is equivalent to .20 of a standard deviation difference on midterm II. The direction of the effect is opposite of that predicted although it is not significant. It is apparent that the addition of overt

self-reinforcement and self-punishment in the form of self-ratings did not enhance the effects obtained with self-monitoring alone in this experiment.

Thus, it is clear that in Experiment 1, Hypothesis 1 was supported, whereas Hypothesis 2 was not. Table 4 includes the adjusted and observed means for the three conditions.

Table 4

Adjusted and Observed Midterm II Mean Scores in Chemistry by Condition

	Control		SM+C		SM	
	$\bar{X}$	n	$\bar{X}$	n	$\bar{X}$	n
Adjusted	70.59	51	73.88	52	76.49	46
Observed	71.25		75.42		74.28	
Observed s.d.	17.21		17.83		17.85	

Experiment 2--Calculus

Neither Hypothesis 1 nor Hypothesis 2 was supported in Experiment 2 using a calculus class. Once again, it was predicted in Hypothesis 1 that student test performance would be superior in those conditions using self-control techniques (SM and SM+C) when compared with controls. No significant difference was obtained, F (1, 76) = .346, p < .558, using adjusted means. The

least squares estimate of the contrast was 1.97 with a standard error of 3.52. The confidence interval is 1.97 ± 6.90.

The size and direction of the difference is evident in the estimate of the contrast, 1.97. On the average, the control groups' test scores were about 2 points higher than that of the experimental condition. Although the difference was not significant, it was in the opposite direction of that predicted. The standard deviation for the adjusted mean on midterm II in calculus was 14.77, therefore, the 1.97 point difference is equal to .13 standard deviations.

It was predicted in Hypothesis 2 that students in the SM+C condition, which included both self-monitoring and self-rating, would have higher test performance than students who merely monitored their study time in the SM condition. No significant difference was obtained on midterm II in a comparison of the two experimental conditions, F (1, 76) = .642, p < .425, using adjusted means. The least squares estimate of the contrast was 3.29 with a standard error of 4.11. The confidence interval is 4.11 ± 8.05.

The size and direction of the difference is evident in the contrast, 3.29. On the average, the students in the SM+C condition scored 3.3 points higher on midterm II than students in the SM condition. Although the

difference was not significant, the direction of the difference is as predicted.

In Experiment 2, no support for either hypothesis was found. The use of these specific self-control techniques did not enhance academic performance. Table 5 includes the adjusted and observed means for the three conditions.

Table 5

Adjusted and Observed Midterm II Mean Scores in Calculus by Condition

	Control		SM+C		SM	
	$\bar{X}$	n	$\bar{X}$	n	$\bar{X}$	n
Adjusted	73.23	27	72.90	25	69.61	28
Observed	75.15		69.96		70.64	
Observed s.d.	18.97		19.97		17.09	

Reported Study Time

It was predicted in Hypothesis 3 that students in the SM+C condition would report a higher mean study time compared with students in the SM condition. Significant differences between experimental conditions were not obtained in either Experiment 1 or Experiment 2 when the average study time for the three-week experimental period was compared. Table 6 contains the daily average reported study time for each of the 21 days. Table 7 contains the average daily reported study time for each of the

Table 6

Average Daily Reported Study Time in Minutes by Day, Condition, and Course

Day			Experiment 1			Experiment 2		
			Chemistry[a]			Calculus		
			SM	SM+C	Total	SM	SM+C	Total
1	(M)	$\bar{X}$	19.89	34.52	27.65	22.32	17.20	19.90
			(31.77)[b]	(53.50)	(45.02)	(25.84)	(26.70)	(26.12)
2	(T)	$\bar{X}$	38.58	49.52	44.39	14.82	11.00	13.02
			(56.88)	(63.89)	(60.64)	(23.79)	(19.69)	(21.82)
3	(W)	$\bar{X}$	28.80	43.87	36.80	21.61	28.40	24.81
			(42.72)	(65.49)	(56.20)	(28.55)	(39.34)	(33.90)
4	(T)	$\bar{X}$	34.13	24.90	29.24	21.61	20.80	21.23
			(47.52)	(36.86)	(42.23)	(29.25)	(30.30)	(29.47)
5	(F)	$\bar{X}$	41.63	30.39	35.66	9.11	11.40	10.19
			(55.46)	(38.82)	(47.44)	(18.56)	(25.23)	(21.77)
6	(S)	$\bar{X}$	48.04	35.77	41.53	16.96	16.00	16.51
			(60.35)	(71.14)	(66.25)	(34.84)	(25.82)	(30.63)
7	(S)	$\bar{X}$	84.87	73.75	78.97	13.57	16.60	15.00
			(99.44)	(93.47)	(95.99)	(22.64)	(36.59)	(29.78)
8	(M)	$\bar{X}$	58.70	53.46	85.92	20.89	26.00	23.30
			(66.11)	(56.50)	(60.94)	(33.36)	(40.83)	(36.79)
9	(T)	$\bar{X}$	53.70	60.39	57.25	38.04	29.80	34.15
			(81.68)	(90.48)	(86.08)	(51.07)	(43.60)	(47.42)
10	(W)	$\bar{X}$	61.52	57.40	59.34	27.86	28.12	27.98
			(61.39)	(86.25)	(75.26)	(40.52)	(44.23)	(41.89)
11	(T)	$\bar{X}$	59.57	66.25	63.11	28.86	19.20	24.30
			(78.68)	(76.91)	(77.42)	(45.53)	(32.65)	(39.90)
12	(F)	$\bar{X}$	54.56	35.87	44.64	14.64	18.00	16.23
			(68.26)	(46.73)	(58.29)	(26.87)	(34.85)	(30.63)
13	(S)	$\bar{X}$	74.20	60.77	67.07	6.07	14.60	10.09
			(107.10)	(103.55)	(104.90)	(14.74)	(33.41)	(25.43)
14	(S)	$\bar{X}$	87.61	55.00	70.31	20.54	46.00	32.55
			(109.42)	(76.73)	(94.43)	(35.86)	(58.67)	(49.20)
15	(M)	$\bar{X}$	96.41	82.21	88.88	28.57	38.64	33.32
			(98.45)	(95.88)	(96.85)	(41.25)	(50.03)	(45.43)
16	(T)	$\bar{X}$	105.54	129.52	118.27	37.86	46.04	41.72
			(106.11)	(118.00)	(112.64)	(69.38)	(58.00)	(63.79)
17	(W)	$\bar{X}$	173.04	153.94	162.91	29.29	30.80	30.00
			(100.42)	(106.80)	(103.77)	(39.29)	(36.53)	(37.66)
18	(T)	$\bar{X}$	227.94	224.92	226.34	42.32	20.20	31.89
			(133.79)	(169.21)	(152.84)	(57.57)	(37.21)	(49.84)
19	(F)	$\bar{X}$	173.80	144.90	58.47	27.32	26.20	26.79
			(92.65)	(86.02)	(89.90)	(60.62)	(48.80)	(54.84)
20	(S)	$\bar{X}$	-	-	-	46.25	44.44	45.40
			-	-	-	(67.15)	(71.87)	(68.75)
21	(S)	$\bar{X}$	-	-	-	48.39	52.80	50.47
			-	-	-	(58.52)	(81.93)	(69.86)

Note. The n's are as follows: Chemistry, SM = 46, SM+C = 52, Total = 98; Calculus, SM = 28, SM+C = 25, Total = 53.

[a]Daily study time was not reported on the 20th and 21st days in chemistry because midterm II was held at the end of the 19th day.

[b]Standard deviations are enclosed in parentheses.

Table 7

Average Daily Reported Study Time in Minutes by Week, Condition, and Course

Week		Experiment 1			Experiment 2		
		Chemistry[a]			Calculus		
		SM	SM+C	Total	SM	SM+C	Total
1	$\bar{X}$	42.28	41.82	42.03	17.14	17.34	17.24
		(32.13)[b]	(33.26)	(32.57)	(14.58)	(15.47)	(14.86)
2	$\bar{X}$	64.26	55.59	59.66	22.41	25.96	24.09
		(46.87)	(50.67)	(48.87)	(18.46)	(19.63)	(18.92)
3	$\bar{X}$	155.35	147.10	150.97	37.14	37.02	37.08
		(78.66)	(76.73)	(77.35)	(28.54)	(25.12)	(26.72)

Note. The n's are as follows: Chemistry, SM = 46, SM+C = 52, Total = 98; Calculus, SM = 28, SM+C = 25, Total = 53.

[a]Daily study time was not reported on the 20th and 21st days in chemistry, hence, the weekly average for the third week is based on data from 5 days.

[b]Standard deviations are enclosed in parentheses.

three weeks. The average daily reported study time is presented in Table 8 by condition and course for the entire experimental period.

Table 8

Average Daily Reported Study Time in Minutes over the Three-week Experimental Period by Condition and Course

	SM	SM+C	Total
Experiment 1-- chemistry[a]	80.13 (41.02)	74.60 (37.69)	77.20 (39.18)
Experiment 2-- calculus	25.57 (17.67)	26.77 (16.68)	26.14 (17.06)

Note. The n's are as follows: chemistry, SM = 46, SM+C = 52, total = 98; calculus, SM = 28, SM+C = 25, total = 53.

[a]Average for the experimental period is 19 days instead of 21.

Four observations may be made from the tables. As is apparent in Tables 6 and 7, reported study time steadily increased over the three-week period. Table 7 contains the average daily reported study time for each of the three weeks. In chemistry, average daily reported study time increased, over the three-week period, by a factor of approximately 3.7 for the SM condition and 3.5 for the SM+C condition. Students averaged about 42 minutes a day during the first week and increased to about 2.5 hours a day during the third week. In

calculus the increase was smaller. Average daily reported study time increased approximately 2.1 times during the three-week period. Students reported daily study time of approximately 17 minutes during the first week and 37 minutes during the third week. Thus, a second observation is that reported study time increased much more in the chemistry class when compared with calculus students' reports. Thirdly, as is readily apparent in Tables 7 and 8 students in chemistry reported much higher average study time over the entire experimental period. During the first week, chemistry students reported they studied approximately 2.5 times the amount reported in calculus. By the third week chemistry students reported study time 4.2 times the amount indicated by calculus students. Chemistry students' lowest average study time was higher than the highest average time reported by calculus students. A fourth and final observation is that both daily and weekly averages are associated with high variability. This is particularly evident in Table 6 which includes daily study time. The standard deviations are often larger than the value of the daily average. Considerable differences existed among students in the amount of time they reported studying.

In addition to such observations made from visual inspection of Tables 6, 7, and 8, a multivariate

repeated measures analysis of variance was performed on the reported study time data. Three questions were formally addressed with this analysis. First, was there an experimental condition by time interaction? Second, was there a significant difference between the two experimental conditions in the amount of study time reported? Third, was there a significant difference in time reported over the three-week period?

In Experiment 1, chemistry, the interaction between experimental condition and time was not significant, multivariate F (2, 95) = .471, $p < .626$. Thus, the pattern of study time reported did not vary differentially between the two conditions. Furthermore, there was no significant difference between the two experimental conditions with regard to the study time reported over the three-week period, F (1, 96) = .47, $p < .492$. However, with regard to the third question, there was a significant difference in the amount of study time reported over the three-week period, multivariate F (2, 95) = 96.10, $p < .0001$. That is, there was a significant increase in the amount of time chemistry students reported studying over the three-week period.

Associated with the above procedures one can fit a polynomial model to the data points to determine whether the points are best represented by a linear equation or a higher degree equation. The step down F for testing

the fit of a higher order equation was 1.12, $p < .292$, which is not significant. The step-down F for a linear equation was 190.84, $p < .0001$, indicating that the best fit was a linear model. This implies that the data points in Figure 1, drawn from the totals for the experimental conditions listed in Table 7, for the chemistry class can be represented best by a straight line.

In Experiment 2, calculus, the results were similar. The interaction between experimental condition and time was not significant, multivariate F (2, 50) = .31, $p < .732$. In addition, there was no significant difference between the two experimental conditions with regard to reported study time over the three-week period, F (1, 51) = .07, $p < .800$. However, a significant difference was obtained in the amount of study time reported over the three-week period, multivariate F (2, 50) = 21.69, $p < .0001$. The best fitting model was, once again, linear with a step-down F of 43.16, $p < .0001$; whereas, the test for a higher order equation was not significant, step-down F of .59, $p < .451$.

Figure 1 portrays the average weekly study time for the combined experimental conditions, SM and SM+C. It is apparent from the results of the repeated measures analysis and Figure 1 that the observations made previously from visual inspection of Tables 6, 7, and 8 have

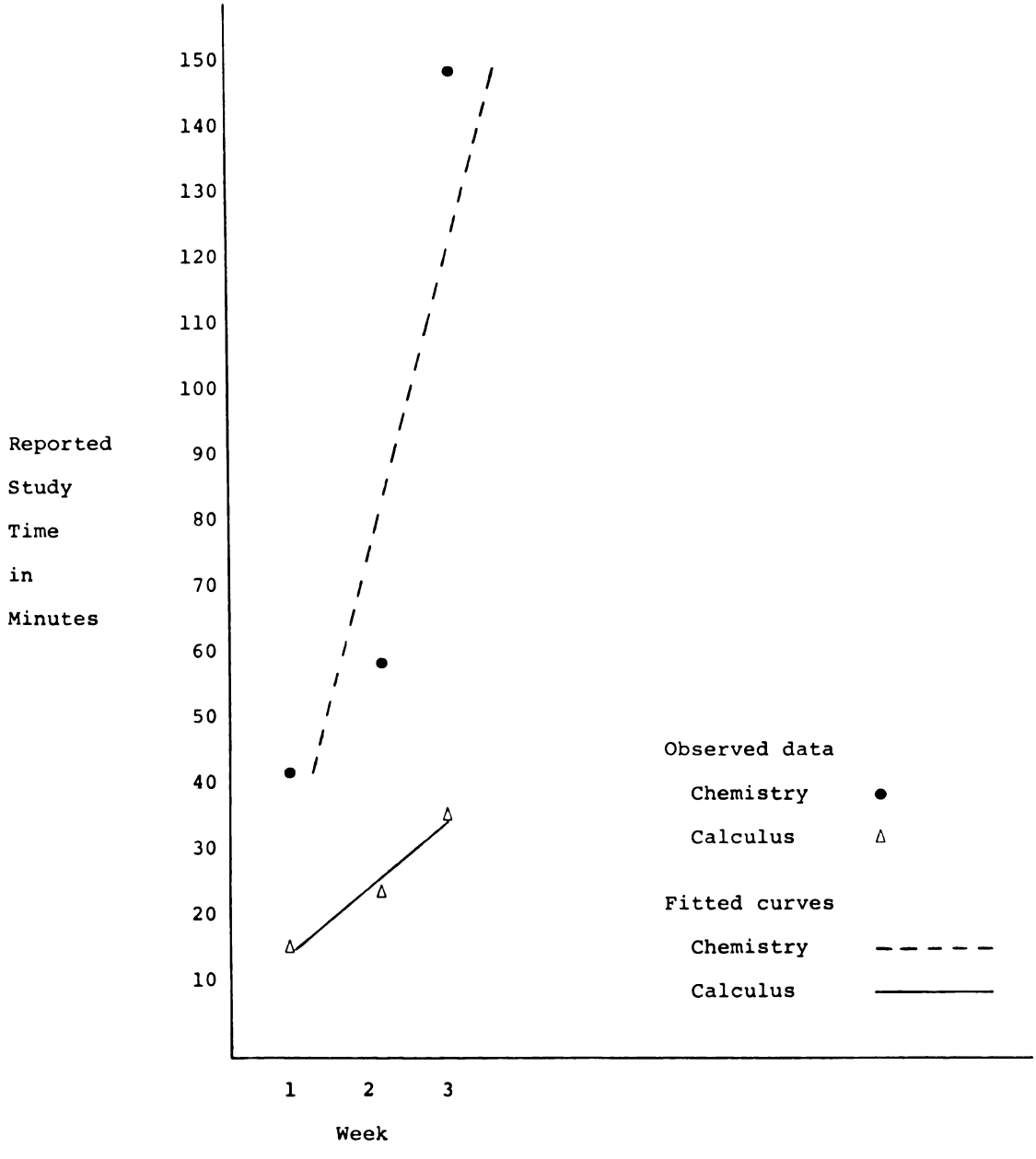


Figure 1. Reported study time by week and course for combined SM and SM+C conditions.

been confirmed. Study time does increase steadily, the increases are greater in the chemistry class, and students in chemistry begin studying at a higher rate than that attained by calculus students as of the final week of the experimental period.

Self-rating of Study Time

No hypotheses were made with regard to daily study time rating. As in reported study time measures, daily study time rating is a by-product of the independent variable used for an experimental condition. As such it is only available for subjects in the SM+C condition which required both self-monitoring and a combination self-reinforcement and self-punishment in the form of self-rating. Despite the fact that study time ratings are unavailable for the other two conditions, examination of the responses made for the SM+C condition are interesting, in and of themselves.

Students recorded either a plus (+) or a minus (-) when they rated their daily study time. They were instructed to rate only whether they thought the quantity of time was adequate or inadequate. Positive ratings were coded as 2's and negative ratings were coded as 1's; hence, the midpoint of the range is 1.5. Average scores that are above 1.5 indicate an overall positive assessment of the day or week's study time. Conversely, scores below a 1.5 indicate a negative assessment. Table 9

contains the average daily rating of study time for each of the three weeks. Table 10 contains the average rating of study time for each day in the experimental period.

Table 9

Weekly Average Rating of Daily Study Time in Condition 2, SM+C, by Course

Week	Experiment 1		Experiment 2	
	Chemistry[a]		Calculus	
	$\bar{X}$	s	$\bar{X}$	s
1	1.39	(0.25)	1.59	(0.27)
2	1.41	(0.25)	1.40	(0.29)
3	1.63	(0.28)	1.53	(0.24)

Note. In Chemistry, n = 52; in Calculus, n = 25.

[a]Ratings were not obtained for the 20th and 21st days in chemistry.

Two observations can be made from these tables. First, chemistry students tended to rate their study time negatively. On only 5 of 19 days (26%) did students in chemistry give themselves a positive rating. Four of these 5 days were during the third week when study time was averaging 2.5 hours a day. In calculus, positive ratings were given for 10 of 21 days (48%). These ratings were included in the first week when reported study time was a low average of 17 minutes daily, and, during the third week when reported study

Table 10

Average Rating of Daily Study Time in Condition 2, SM+C, by Course

Day		Experiment 1 Chemistry[a]		Experiment 2 Calculus	
		$\bar{X}$	s	$\bar{X}$	s
1	(M)	1.44	0.50	1.84	0.35
2	(T)	1.48	0.51	1.48	0.51
3	(W)	1.42	0.50	1.60	0.50
4	(T)	1.37	0.49	1.64	0.49
5	(F)	1.40	0.50	1.52	0.51
6	(S)	1.17	0.38	1.56	0.51
7	(S)	1.44	0.50	1.48	0.51
8	(M)	1.48	0.51	1.36	0.49
9	(T)	1.39	0.49	1.40	0.50
10	(W)	1.44	0.50	1.36	0.49
11	(T)	1.48	0.51	1.48	0.51
12	(F)	1.35	0.41	1.36	0.49
13	(S)	1.33	0.47	1.44	0.51
14	(S)	1.42	0.50	1.40	0.50
15	(M)	1.48	0.51	1.40	0.50
16	(T)	1.54	0.50	1.60	0.50
17	(W)	1.75	0.44	1.52	0.51
18	(T)	1.64	0.49	1.40	0.50
19	(F)	1.75	0.44	1.64	0.49
20	(S)	-	-	1.56	0.51
21	(S)	-	-	1.60	0.50

Note. In Chemistry, n = 52; in Calculus, n = 25. Values that are underlined are positive ratings.

[a]In chemistry midterm II was held at the end of the 19th day, hence ratings were not obtained for the 20th and 21st days.

time had increased to 37 minutes daily. A second observation, then, is that the self-ratings differed between the two classes. Calculus students consistently rated their study time more positively despite the fact that their reported time was considerably lower than that reported in chemistry.

Questionnaire Responses

Questionnaires were distributed to all subjects in both experimental conditions at the time of the second class midterm. The questionnaire had two sections--conformity to instructions and student opinion. For subjects in the SM+C condition, 13 of the 16 objective items were designed to assess conformity to instructions. These 13 questions included 4 on self-rating procedures. The last 3 questions--items 14, 15, and 16--examined student opinion about the impact of the project on their study time and future plans about monitoring study time.

Subjects in the SM condition had a 9-item section, out of a 12-item questionnaire, designed to assess conformity to instructions. The questions were identical to those asked of the SM+C subjects. (The 4 questions on self-rating were appropriately deleted because this condition did not use overt self-rating.) The remaining 3 questions on student opinion were identical to those asked of the SM+C subjects.

In preparing for the analysis of questionnaire data, questions on the 12-item SM condition questionnaire were renumbered so that identical questions also had identical item numbers for data processing and data display purposes. This is portrayed in Table 11. Items 6, 8, 9, and 11 were not included in the questionnaire received by subjects in the SM condition. (Appendices 8 and 9 include the actual instruments used.)

Conformity to Instructions

Students could select one of four responses to items 1 to 13--"always," "usually," "rarely," "never." In scoring the questionnaire, a 4 was given to the most desirable response and a 1 to the least desirable. For items 1-9, 12, and 13, a 4 corresponded to "always." Conversely, a 4 corresponded to "never" for items 10 and 11. This procedure permitted the computation of a mean score, indicating overall conformity to instructions, which is presented in Table 12. It is apparent that an overall high level of conformity to instructions was obtained in both experimental conditions in both classes. This is an important finding indicating that the differences in effectiveness of the experimental treatment of each class cannot be attributed to differences in following instructions.

Examination of the average response to each item, included in Table 12, indicates, as well, that students

Table 11

Average Score on Questionnaire Items by Course and Conditions

Questionnaire Items		Experiment 1			Experiment 2		
		Chemistry			Calculus		
		SM	SM+C	Total	SM	SM+C	Total
1. Each day I recorded the amount of time I studied for this class.	$\bar{X}$	3.13 (0.69)[a]	3.35 (0.68)	3.25 (0.69)	3.32 (0.72)	3.32 (0.63)	3.32 (0.67)
2. In addition, each day I graphed the time I spent in this class.	$\bar{X}$	2.65 (1.04)	2.71 (1.14)	2.68 (1.09)	2.29 (1.18)	2.36 (1.22)	2.32 (1.18)
3. I included in my study time total time I spent reading, working problems, outlining, and so on.	$\bar{X}$	3.87 (0.60)	3.89 (0.38)	3.88 (0.39)	3.96 (0.19)	3.80 (0.65)	3.89 (0.47)
4. I excluded class time in my daily totals of study time.	$\bar{X}$	3.87 (0.62)	3.83 (0.64)	3.85 (0.63)	3.96 (0.19)	4.00 (0.00)	3.98 (0.14)
5. I avoided discussions of the project with other classmates.	$\bar{X}$	3.48 (0.75)	3.10 (0.93)	3.28 (0.87)	3.36 (0.73)	3.44 (0.77)	3.40 (0.74)
6. I rated the amount of time I spent on this class with either a + or a - each day.	$\bar{X}$	-	3.65	3.65	-	3.88	3.88
	s	-	(0.79)	(0.79)	-	(0.33)	(0.33)
7. I recorded the amount of time I studied for this class as soon as I finished studying or at the end of each day.	$\bar{X}$	2.94	2.87	2.90	2.86	2.92	2.89
	s	(0.65)	(0.72)	(0.68)	(0.76)	(0.76)	(0.75)
8. I rated the amount of time I studied for this class when I recorded the amount.	$\bar{X}$	-	3.67	3.67	-	3.64	3.64
		-	(0.71)	(0.71)	-	(0.64)	(0.64)
9. My rating was based on my own opinion of what amount of time was adequate for the day.	$\bar{X}$	-	3.69	3.69	-	3.76	3.76
		-	(0.61)	(0.61)	-	(0.72)	(0.72)
10. I encouraged other students in my class who were not assigned the project to try graphing their study time.	$\bar{X}$	3.67 (0.73)	3.85 (0.42)	3.77 (0.59)	3.82 (0.55)	3.84 (0.62)	3.83 (0.58)
11. I also encouraged other students not assigned the project to rate their study time.	$\bar{X}$	-	3.92	3.92	-	3.84	3.84
		-	(0.27)	(0.27)	-	(0.62)	(0.62)
12. My record of time studied was honest.	$\bar{X}$	3.76 (0.43)	3.73 (0.45)	3.75 (0.44)	3.75 (0.44)	3.80 (0.41)	3.77 (0.42)
13. When I didn't study on a given day I recorded 0 in the daily study time log.	$\bar{X}$	4.00 (0.00)	3.96 (0.19)	3.98 (0.14)	4.00 (0.00)	4.00 (0.00)	4.00 (0.00)
14. I believe I studied more for this class as a result of this project.	$\bar{X}$	1.96 (0.76)	1.92 (0.74)	1.94 (0.74)	1.79 (0.69)	2.12 (0.73)	1.94 (0.72)
15. I will continue to record and graph my study time in this class.	$\bar{X}$	1.87 (0.75)	1.77 (0.70)	1.82 (0.72)	1.71 (0.54)	2.00 (0.58)	1.85 (0.57)
16. I will try recording and graphing my study time in other classes.	$\bar{X}$	1.78 (0.59)	1.77 (0.68)	1.78 (0.64)	1.93 (0.66)	1.96 (0.54)	1.94 (0.60)

Note. The n's are as follows: Chemistry, SM = 46, SM+C = 52; Calculus, SM = 28; SM+C = 25. The n for the total for a given item depends on the number of the experimental conditions that included the item.

[a]Standard deviations are enclosed in parentheses.

typically conformed to instructions. Excellent responses were obtained to items 3, 4, 6, 9, 10, 11, 12, and 13. Scores on these items were approximately 3.6 or higher. Students, thus, included the appropriate information in their reported study time (items 3 and 4), followed the rating procedure (items 6 and 9), conformed to a request that they not encourage other students not assigned the project to graph or rate their study time (items 10 and 11), and, reported honest responses (items 12 and 13).

Table 12

Average Score on Questionnaire (Items 1-13) Assessing Conformity to Instructions by Course and Condition

Condition	Experiment 1		Experiment 2	
	Chemistry		Calculus	
	$\bar{X}$	s	$\bar{X}$	s
SM	3.49	(0.29)	3.48	(0.31)
SM+C	3.56	(0.27)	3.58	(0.27)

Note. The n's are as follows: Chemistry, SM = 46, SM+C = 52; Calculus, SM = 28, SM+C = 25.

Good responses were obtained to items 1 and 5 with scores ranging from 3.1 to 3.5. Students indicated that each day they usually recorded the amount of time studied (item 1) and avoided discussions of the project with classmates in general (item 5).

Fair responses were obtained to items 2 and 7 with scores ranging from 2.3 to 2.9. Students indicated that they usually recorded the amount of study time at the end of studying or the end of the day (item 7); however, they were between "rarely" and "usually" in their response to daily graphing. Follow-up conversation with students indicated that they typically plotted the graph at the end of the week.

Student Opinion Items

Students could select one of four responses to items 14, 15, and 16--"strongly agree," "agree," "disagree," "strongly disagree." These responses were scored 4, 3, 2, 1 respectively. Students typically disagreed with the statement that the project increased their study time (item 14). They also disagreed with statements about continued use of the procedures (items 15 and 16).

Correlations between Reported Study Time and Midterm II

Correlations were computed between average reported study time and grade on midterm II in chemistry $r = -.033$, $n = 98$; in calculus, $r = .004$, $n = 53$. There were no significant correlations.

CHAPTER V

DISCUSSION

The discussion of results obtained in the present investigation will follow the order of presentation used in the preceding chapter. Discussion will begin with the primary dependent variable of interest, academic performance, and the two related hypotheses under investigation. Attention will, then, focus on Hypothesis 3 and information on reported study time, followed by an examination of the study time rating findings. A discussion of questionnaire responses will follow. Finally, conclusions about the present investigation will be drawn and recommendations for further research will be made.

Academic Performance

The conflicting results obtained when identical self-control techniques were used in two different classes is interesting in light of the earlier discussion of subject selection bias in self-control investigations (McLaughlin, 1976). As noted earlier, the 15 self-control investigations examining the academic performance of

college students were limited to two basic groups of subjects. Subjects were either introductory psychology students or volunteers seeking assistance with study habits or other study behaviors. The present investigation, however, utilized a chemistry class and a calculus class. It is plausible that there are characteristics of various university courses or subject matter areas that interact with self-control techniques. For example, courses with a lower difficulty level could make the use of self-control techniques such as self-monitoring and self-rating superfluous because the course required little effort from a particular student or group of students. Or, a course could be so structured, including daily or weekly quizzes, that the effects of self-control techniques, designed to keep a student up to date in a class, would be unnecessary. The external structure and demands would be serving this purpose. In a similar example, a small seminar requiring informed participation could also make self-control techniques designed to assure daily preparedness unnecessary. Conversely, a student in a large lecture class with only one or two exams and optional attendance could find self-control techniques helpful when applied to completing reading assignments and attendance. In general, self-control techniques used in courses requiring mastery of specific content might be more helpful to students than when used in courses emphasizing

process rather than product, or a course requiring a creative product such as an essay or a research paper. In the latter case, however, self-control techniques designed to insure that a student begins writing early in the course, leaving time for review and rewriting, could be facilitative.

These are just a few examples of aspects of courses that could differ and interact with self-control techniques--difficulty level, imposed structure, attendance requirements, class size and concomitant demands for participation, and type of academic product required. Mahoney, Moore, Wade, and Moura (1973) reported that self-monitoring was differentially effective in improving accuracy on sample problems on the Graduate Record Exam. No effects were obtained for verbal accuracy, however, accuracy was improved significantly in quantitative problems. It appears that the differential effectiveness of self-control techniques in different types of courses needs further investigation. It is clear from the present investigation that generalization about academic performance and self-control techniques across the full range of college level courses would be unwarranted.

With regard to the hypotheses related to academic performance, conflicting results from Experiments 1 and 2 indicate only partial support for Hypothesis 1. In Hypothesis 1 it was predicted that students who utilized

self-control techniques would evidence superior test performance relative to controls. Evidence in support of this hypothesis was obtained in Experiment 1 using a chemistry class, however, significant differences between experimental and control groups were not obtained in Experiment 2.

It was predicted in Hypothesis 2 that students in the SM+C condition would perform significantly better than students in the SM condition. No significant difference in support of this hypothesis was obtained in either experiment. In chemistry, the students who simply monitored their study time (SM) evidenced slightly higher scores than those who monitored and used an overt self-rating procedure (SM+C). In calculus, the opposite finding was obtained. In both cases, however, the results do not depart significantly from results that could be obtained by chance.

It is clear that the addition of self-reinforcement and self-punishment in the form of self-ratings did not enhance the self-monitoring effect when it occurred. Furthermore, it is apparent from the questionnaire results that students in both condition appeared to follow instructions well, eliminating the possibility of differential conformity to instructions. Bellack (1976) was previously quoted as asserting that "the explicit use of SR [self-reinforcement] critically augments whatever

effects SM [self-monitoring] has" (p. 74). This was certainly not the case in the present investigation.

It is important to recognize, however, that self-rating, the particular operational definition selected for the self-reinforcement/self-punishment combination, was selected because of its approximation to the hypothesized internal evaluation process that is implicit in self-monitoring. Self-rating constitutes an overt manifestation of the implicit processes hypothesized to contribute to the effects obtained with self-monitoring alone. Self-rating is a symbolic, as opposed to tangible, reinforcer. Perhaps there are differences in the effectiveness of symbolic and tangible reinforcers that interact with a variety of characteristics of the subject, setting, or dependent variable. Such differences could account for the failure of the self-reinforcement/self-punishment procedure to augment the self-monitoring effect.

It may be that Bellack (1976) is right, then, if self-reinforcement is defined more precisely to be tangible self-reinforcement. Certainly such reinforcers as money or points toward grades could be expected to exert a more powerful influence, relative to self-ratings. Bandura (1974a) indicated that he expects the insufficiency of material reinforcement to be recognized and the importance of covert self-reinforcement to

be acknowledged. "Most people value their self-respect above commodities," he writes (p. 863). It is not at all clear that they do. This is an empirical question and the differential effectiveness of covert self-reinforcement, overt symbolic reinforcers, and tangible reinforcers needs further investigation.

In the present investigation, the failure to find differences between the SM and SM+C conditions is also a success in finding similarities. That is, it seems that the overt self-reinforcement/self-punishment procedures used in the SM+C condition do not differ significantly from self-monitoring procedures and their presumed implicit self-rating components. This finding lends some support to the contention that self-monitoring effects result from more than merely recording behavior. Such effects could be due to a covert self-reinforcement / punishment process, much like that of self-rating.

Reported Study Time

Lessons can be drawn from conflicting results and evidence from the reported study time data provides a good example. The conflicting results obtained between Experiments 1 and 2 with regard to academic performance take on a new look when the reported study times for each class are examined. It would appear that the two classes differed markedly in difficulty level or amount of studying required. Study times were reported

by two-thirds of both classes, and despite the wide variability in individual study times, a course pattern was evident over the weeks. Clearly, students in the chemistry class began the experimental period with a much higher average daily study time relative to calculus students (2.5 times). (It should be remembered that the 1st week of the experimental period was actually the fourth week of the course. It was also the week immediately following the first midterm exam.) By the third week, their average daily reported study time was 4.2 times higher than that of calculus students. Chemistry students were averaging approximately 2.5 hours a day, seven days a week.

The study times reported by calculus students were never very high; neither did they increase very much even when a midterm exam was pending. Conversely, chemistry students' average times were quite high and their increases were dramatic. It appears that reported study time can serve as a kind of unobtrusive measure of student opinion about the difficulty levels of different courses. Kanfer, Cox, Greiner, and Karoly (1974) have suggested that "more attention be given to a stage prior to execution of self-control in which promises, intentions, or performance criteria are developed since these events may determine later execution of self-control" (p. 606).

It is very possible that self-control techniques have little impact on a situation in which minimal self-control is required to obtain the desired results. If students have discerned that only a small amount of effort is required to attain their goal, which may be either a grade or knowledge of the subject matter, there is little more for self-control techniques to accomplish. A variety of situational and subject variables that affected the performance of self-control techniques were discussed in Chapter III. In particular, Kanfer and Duerfeldt (1967b) reported that both external reinforcement and self-reward procedures were equally ineffective in facilitating recall of material that had been overlearned. A similar circumstance may exist when minimal effort toward initial learning is required. Some of the conflicting results in self-control applications could be due to such uncontrolled effects of course or task difficulty level. These factors are deserving of further investigation.

With regard to the reported increases in study time over the experimental period, it is important to recognize that these increases cannot be attributed to the experimental manipulations--the self-control techniques. Many other factors could have influenced study time during the three-week period and they are confounded with the treatment. It is appropriate, however, to attribute the obtained differences in academic performance

(in Experime

of the prese

performance.

the control

act of repor

variable or

conditions.

that the con

Hence, it is

increased ov

similarly fo

class, and t

two classes.

to the exper

a control gr

None

in reported

for whom we

accounting f

academic per

the fitted l

measures ana

observation

for the two

the experime

chemistry en

(in Experiment 1) to the self-control techniques because of the presence of information about a control group's performance. Information on the reported study time of the control groups is not available, however, because the act of reporting study time was part of the independent variable or experimental manipulation for the SM and SM+C conditions. This investigation was designed precisely so that the control groups would not monitor study time. Hence, it is legitimate to observe that study time increased over the three-week period, that it increased similarly for the two experimental conditions within each class, and that it increased differentially between the two classes. The increases, however, may not be attributed to the experimental manipulation without information about a control group.

Nonetheless, the differential rates and increases in reported study time, on the two-thirds of the students for whom we do have data, offer valuable information in accounting for the conflicting results with regard to academic performance in the two experiments. Furthermore, the fitted linear model from the multivariate repeated measures analysis depicted in Figure 1 permits the observation that the slopes of the lines are different for the two classes. This suggests the possibility that the experimental treatments found to be effective in chemistry enhanced the increase in study time that would

be obtained
It may be t
in which th
tive, repre
suggestions
emphasized

The
in both cla
assistance
the two exp
only availa
required to
the three e
class is po

Inte
from each c
only rated t
time. Furth
during the w
hours a day.
tively for t
17 minutes a
study time p
observations
students in

be obtained in a three-week period between examinations It may be that the trend observed in the calculus class, in which the experimental manipulations were not effective, represents a type of baseline. Although these suggestions seem reasonable from Figure 1, it must be emphasized that they are only conjecture.

Self-rating of Study Time

The self-ratings provided by the SM+C condition in both classes also provide valuable information and assistance in accounting for the discrepancies between the two experiments. Self-ratings are intentionally only available for the one experimental condition required to self-rate. As such, no comparisons among the three experimental conditions within an individual class is possible.

Interestingly, comparison of the self-ratings from each class indicated that students in chemistry only rated their study time positively about 26% of the time. Furthermore, they gave such self-ratings largely during the week they were studying approximately 2.5 hours a day. Calculus students rated study time positively for the first week when it was approximately 17 minutes a day during the third week. They rated study time positively about 48% of the time. These observations give further support to the notion that students in calculus simply required far less study

time than their counterparts in chemistry in order to complete the course or meet self-established performance criteria.

Questionnaire Responses

Conformity to Instructions

The questionnaire was designed primarily to provide an independent opportunity to determine whether students in the experimental conditions followed their instructions. Overall, students indicated a high level of conformity, averaging about a 3.5 to a 3.6 on a 4.00 scale. There were no significant differences between the two conditions within a class; neither were there any significant differences between the two classes. This is an important finding. The failure to obtain effects for the self-control techniques in Experiment 2 cannot be attributed to any difference in conformity to instructions between the two classes. Explanations for the discrepant results must be, and have been, sought elsewhere. In one setting the techniques enhanced academic performance; in another setting they did not. In both settings, however, students did what they were asked to do.

Accuracy of Self-report

Two of the items designed to assess conformity to instructions provide some insight about the accuracy

of the se
of study t
averaged t
"usually"
number 14,
I recorded
averaged 3
Thus, it a
study times
would be re
conformity

No
estimates f
possible me
flawed. Fo
subject to
recorded st
investigati
vised setti
their self-
polated to
(Bristol &
deemed wort

The
length. It
gations on

of the self-report measure. Item 13 stated "my record of study time was honest." Responses to this item averaged to be about 3.75 which is a midpoint between "usually" and "always" on the scale. A related item, number 14, stated "when I didn't study on a given day, I recorded 0 in the daily study time log." Responses averaged 3.98 and 4.00 for Experiment 1 and 2 respectively. Thus, it appears reasonable to conclude that the reported study times were accurate and honest. Otherwise, one would be required to conclude that there was tremendous conformity among subjects in a lying behavior.

No other attempts were made to obtain reliability estimates for the self-report measures. A variety of possible methods were considered but found to be seriously flawed. For example, an experimenter could require each subject to have another person verify the student's recorded study time. (Who verifies the verifier?) One investigation had students study occasionally in supervised settings, and, then, assessed the reliability of their self-observations on these occasions and extrapolated to unsupervised settings and self-reports (Bristol & Sloane, 1974). Such techniques were not deemed worthwhile.

The reliability issue has been discussed at length. It is this author's opinion that to do investigations on either covert behaviors or behaviors in a

nonsupervised setting one must reconcile oneself to the unavailability of formal reliability indices. Three steps were taken to assure honest, accurate responding. Students were assured that the information they provided was anonymous, would remain so, and would not affect their grades. Thus, a safe environment for honest reporting was established. Second, the report forms were developed, pretested, and revised to be certain that they were easily used. Hence, unintentional errors in reporting were minimized. Finally, independent assessment, via questionnaire, was made of the accuracy of their responses.

These factors, together with examination of the actual logs and graphs, the presence of different colored inks for recording, the high variability between and within students' reports, and the presence of a great many zeros in study time logs would seem to provide sufficient assurance that the data are reasonably honest and accurate. Self-recorded study time was not the dependent variable of primary interest, however, even if it had been, this author would be satisfied that these procedures provided satisfactory self-report data.

Student Opinion Items

Three questions were asked of students to which they responded on a continuum of "strongly agree, agree, disagree, strongly disagree." Responses were coded 4, 3,

2, 1 respectively. When asked whether they planned to continue recording and graphing study time, the responses averaged approximately 1.8 across both conditions and both classes. Thus, students uniformly disagreed with the statement. "I will continue to record and graph my study time in this class" (item 15). They also uniformly disagreed with a statement about use of the techniques in other classes, "I will try recording and graphing my study time in other classes" (item 16). Responses to this item averaged about 1.8 and 1.9 in Experiments 1 and 2 respectively.

Lastly, students in both conditions and both classes disagreed with the statement "I believe I studied more for this class as a result of this project" (item 15). Thus, even students in the chemistry class, for whom the experimental manipulation produced significant differences in academic performance, did not believe the procedures increased their study time. As we have discussed, the procedures may or may not have increased their study time. An assessment of this cannot be made. However, the procedure did increase their academic performance. Perhaps the improvement in their academic performance was due to increased study time without the students' awareness that it resulted from the procedures.

The relationship of study time to academic performance or academic behaviors is not a clear-cut one.

Only four studies of the 31 reviewed reported correlations between reported study time and academic performance. Beneke and Harris (1974) reported no significant correlation between the number of hours studied and the number of lessons completed (r = .184) and between hours studied and three semester grade point average gain (r = .027). They did report significant correlation for study time and cumulative gpa (r = .493, $p < .01$). Bristol and Sloane (1974) reported correlations of .45 and .41 for study time and test score, although they did not report significance levels. Johnson and White (1971) found a range of significant correlations between .42 and .82 for different groups using cumulative grade points and study time over an eight-week period. Kaufman and O'Leary reported significant negative correlations between disruptive behavior and the amount of work completed (r = -.50, $p < .005$) although this was not found in all phases of the experiment.

The present investigation reported zero order correlations in both classes between performance on midterm II and an individual's average study time. This seems reasonable in that the study time required to attain a particular level of performance would vary with the ability and background of each student. The precise way in which self-monitoring and self-rating of study time actually affects academic performance is not clear.

This issue will be discussed further in the section on the monitored behavior.

A very few students did indicate that they believed the procedures increased their study time. Such comments were made in the open-ended section of the questionnaire and to the experimenter in conversation. One calculus student remarked that it was one thing to know she wasn't studying very much, and quite another to have that fact staring at her on a piece of paper. However, such comments were few in number.

Related Issues

Demand

Bandura has indicated that awareness is an important factor in behavior change procedures. He has described "reinforcement as an unarticulated way of designating appropriate conduct" (1974a, p. 862). Furthermore, he has observed that "not surprisingly, people change more rapidly if told what behaviors are rewardable and punishable than if they have to discover it from observing the consequences of their actions" (1974a, p. 862). Nevertheless, a decision was made in this investigation to withhold information about the actual purpose of the investigation to avoid confounding the experimental manipulation with an expectation for behavior change. It is common practice in self-control studies to indicate that the procedures are intended to

facilitate behavior change. This is due in part to the emphasis on therapeutic interventions. Thus, it is impossible to know whether the actual technique results in the obtained change, or, the expectation of change results in change.

In this particular investigation, students were given the impression that descriptive data were being obtained about these two classes, required of many lower division students. Such information included average study time and students' perceptions of what constituted adequate study time. Only the faculty member in the course knew that such information was secondary to a comparison of self-control techniques. Even the course teaching assistants were unaware. Thus, students remained unaware of the potential for change that could result from the techniques. Therefore, the change that was obtained cannot be attributed to expectancy effects.

Prior External Reinforcement

As discussed in Chapter II, self-control studies sometimes bring the subject's behavior, first, under control through external reinforcement. Self-control techniques are then implemented to maintain change. This circumstance also contributes to an expectation for change that was not present in this investigation. No prior external reinforcement methods were used. Thus,

subjects were not aware that a change in their behavior was being sought. They were under the impression that descriptive information was being obtained, through time sampling, that would be helpful to OASIS in its work with students. Hence, the absence of prior external reinforcement and the presence of an acceptable rationale for the project, enabled expectancy effects to be controlled. The change obtained in Experiment 1 cannot be attributed to expectancy effects.

The Monitored Behavior

The monitored behavior is another important facet of the present investigation that deserves examination and discussion. It is important to highlight the fact that self-control investigations on academic performance are typically arranged so that a particular behavior with a presumed relationship to academic performance is monitored. Study time, disruptive behavior, or number of pages read are three examples of behaviors that are monitored, followed by assessments of academic performance. In the larger field of self-control investigations, the monitored behavior is often the actual dependent variable of interest (i.e., nailbiting, hallucinating, smoking). The dependent variable is monitored directly in such cases. Weight control studies provide a good example of both methods. In some studies, subjects monitor eating behavior or calorie intake, however, the

dependent variable of interest is actually weight loss. Such studies can also be designed so that weight is the actual behavior monitored (i.e., daily weight charts).

Similarly, studies on academic performance can be designed whereby the dependent variable and the behavior to be monitored are the same. For example, 2nd graders monitor the number of correct arithmetic problems completed each day, rather than monitoring the amount of time spent on arithmetic, and subsequently examining arithmetic performance. This is an important distinction because the effects of monitoring a behavior assumed to influence another behavior is dependent on the correctness of such an assumption and the strength of the relationship.

The present investigation is one in which the actual behavior monitored (study time) was not the primary dependent variable of interest (academic performance). Obviously, there are settings in which such a procedure is preferable or the only option available. Academic performance is assessed far too infrequently in most college classes to be used as the monitored behavior. However, it will be important for future self-control studies to examine whether differential effects are obtained as a result of a distinction between directly monitoring and consequating the particular dependent variable of interest versus one with a presumed relationship to this variable.

One final aspect to be considered about the monitored behavior is apparent in reviewing the study time reported by calculus students. Although the average time ranged from approximately 17 minutes to 37 minutes a day over the three-week period, the variability of daily scores was very high. A great many students recorded zero study time. Thus, we have a situation where the behavior monitored is actually the behavior to be eliminated, namely, not studying. Previously reported investigations have indicated that it is generally desirable to have subjects monitor the behavior to be <u>increased</u>. That was certainly the intention in selecting the behavior of study time. However, the outcome in calculus was the opposite and the behavior to be increased was often not being monitored. For many students in calculus, study time behavior was so infrequent that the monitoring procedure ended up as a procedure whereby "not studying" was actually monitored most of the time. It is impossible to reduce this behavior below zero, however, it may be more difficult to increase a behavior through monitoring or reinforcement when the baseline is nonexistent.

It would seem important in future investigation to determine whether the baseline of the behavior of interest was so low that shaping procedures or some kind of contracting should be used first. Such modifications would not have been appropriate for this particular

research project, but from a practical standpoint, shaping and contracting procedures may be essential to establishing a behavior such that it can, in fact, be monitored and consequated.

Proportion of Self-reinforcement and Self-punishment

In general, punishment techniques are regarded as inferior to reinforcement procedures in obtaining behavior change, despite a great deal of evidence to the contrary. In examining the data on the self-rating of study time, it is interesting to note the preponderance of negative ratings in chemistry. For this class, then, the amount of self-punishment, operationalized as a negative self-rating, was three times the amount of self-reward. Conversely, in calculus the amount of self-reinforcement and self-punishment was approximately equal. We have discussed a possible reason for this discrepancy, namely differing difficulty levels and study demands in each class. Nevertheless, the outcome is such that chemistry students administered self-punishment approximately 74% of the time whereas calculus students administered self-punishment approximately 52% of the time.

It would appear that the combination of self-reinforcement and self-punishment was effective when the proportion of self-punishment was high. This finding casts some doubt on the notion that self-punishment is an

inferior behavior change technique. Future studies would do well to consider the reciprocal nature of the self-punishment/reinforcement contingency and examine the overall amount of reinforcement and punishment present in any experimental period.

Isomorphism

The assumption that "symbolic activities obey the same psychological laws as do overt behaviors" (Meichenbaum & Goodman, 1971, p. 125) has been very important in the development of mediational learning theory and self-control. However, the notion that covert and overt reinforcement/punishment are equally effective in all situations is not essential.

In the present investigation, some question has been raised about the relative strength of covert and overt symbolic reinforcement/punishment processes. The similarities between the effects of the SM and SM+C condition indicate that the addition of overt symbolic reinforcement/punishment process, in this instance, did not enhance self-monitoring effects which appear to result from similar processes that are covert. Yet, prior studies have indicated that reinforcement does augment the self-monitoring effect. It will be important for future investigations to attempt to assess whether such augmentation occurs with tangible reinforcers rather than symbolic.

One possible design to address such a question would compare a control group and subjects who self-monitored, self-monitored and self-rated (overt symbolic reinforcement/punishment process), and self-monitored plus administered a tangible self-reinforcement/punishment contingency. This would permit a comparison of two types of reinforcement-punishment processes--symbolic and tangible. Furthermore, it would also permit a replication of the present investigation comparing presumed covert symbolic and overt symbolic self-reinforcement/punishment processes.

Conclusions

The results of the investigation have been analyzed and discussed. Partial support for the effectiveness of two particular self-control techniques in improving classroom academic performance was demonstrated. Conflicting results from a chemistry and calculus class were examined and partially explained through information on differential course study times and associated difficulty levels. Furthermore, questionnaire results indicating overall conformity to instructions between conditions and between classes eliminates the possibility of differential conformity to instruction as an explanation for the conflicting results. The failure to find differences between the two experimental conditions, SM and SM+C, was interpreted as some evidence

of success in finding similarities. That is, the effects of self-monitoring may be due to a covert self-evaluative process much like the overt self-rating procedure in the SM+C condition. The lack of significant differences between the two experimental conditions in both courses lends support to this conceptualization.

Recommended areas for further research have been made throughout the discussion and will be reiterated in closing. The present investigation suggests the importance of the following issues to a more complete understanding of the self-control process.

1. Additional investigations aimed at isolating the self-monitoring effect should be undertaken using covert symbolic, overt symbolic, and overt tangible reinforcers as well as control groups for comparison. The differential effectiveness of symbolic and tangible reinforcers in self-control investigations of academic performance has not been examined. Likewise, the differential effectiveness of covert and overt symbolic reinforcers on academic performance needs investigation.

2. Self-reinforcement and self-punishment should be conceptualized as integrally related processes. Assessments of the proportion of self-reinforcement and self-punishment in a given investigation should be made. Attempts to determine the most efficacious proportions should be undertaken.

3. Subjects should be selected from a wider variety of subject matter areas to diminish the subject selection bias that exists at present in investigations of self-control and academic performance.

4. Careful attention should be paid to the actual behavior that is being monitored. Future studies should focus on the relative effectiveness of monitoring the behavior to be increased versus the behavior to be decreased.

5. Investigations should seek to determine whether direct monitoring and consequating of the primary dependent variable is superior to monitoring a presumably related behavior. Then, when possible, the preferable technique could be utilized.

6. Efforts should be made to isolate the factor influencing academic performance when study time is the behavior actually monitored. Academic performance-study time correlations are often small and rarely significant, thus, it is important to determine what the active ingredient is in monitoring study time that contributes to improvement in academic performance.

7. Where possible, comparisons should be undertaken to determine whether conditions like SM and SM+C actually result in increased study time. Such a study

would probably have to be conducted in a supervised setting in which unobtrusive assessment of a control group's study time could be made.

8. Course or task difficulty level should be varied systematically and its effect upon self-control techniques should be investigated.

9. Attempts to ascertain the importance of expectancy effects should be undertaken. Comparison should be made of a group which is told that the self-control procedures utilized typically enhance performance versus an uninformed group. The importance of subject awareness could be ascertained similarly.

APPENDICES

APPENDIX A

CALCULUS MIDTERM EXAM 2

APPENDIX A

CALCULUS MIDTERM EXAM 2

Mathematics 1B
2/23/77

Hour Exam (2)

Each intergral is worth 6 points; you receive 10 points for stating your name correctly. Show all work and display each answer. An integral which is done "in your head" & for which there is no work to show must be accompanied by a derivative which checks the integration.

1. $\int (1+2x)^{\frac{1}{2}} dx =$

2. $\int \frac{1}{\sqrt{1+2x}} dx =$

3. $\int (1 + \sin x)^{\frac{1}{2}} \cos x \, dx =$

4. $\int \frac{\cos x}{\sqrt{1 + \sin x}} dx =$

5. $\int \frac{x}{\sqrt{1 - (2x)^2}} dx =$

6. $\int \frac{1}{\sqrt{1 - (2x)^2}} dx =$

7. $\int \frac{\cos x}{\sqrt{1 - \sin^2 x}} dx =$

8. $\int \frac{1}{25 + x^2} dx =$

9. $\int \log x \, dx =$

10. $\int \log (x^2) \, dx =$

11. $\int e^{\sin^2 x + \cos^2 x} dx =$

12. $\int \frac{e^{\sqrt{\sin x}} \cos x}{\sqrt{\sin x}} dx =$

13. $\int x e^x dx =$

14. $\int_{-1}^{+1} \frac{1}{1 + x^2} dx =$

15. $\int_0^1 (1 + 2x)^{\frac{1}{2}} dx =$

APPENDIX B

CHEMISTRY MIDTERM EXAM 2

APPENDIX B

CHEMISTRY MIDTERM EXAM 2

Science 3A - 1977

Second Exam

Name _____

Section _____

Instructions:

1) Write your name and recitation section on all pages.
2) Read over all questions and work problems in order of ease.
3) The point value assigned to each question appears in parenthesis.
4) Make sure there are no pages missing in your exam booklet.
5) Turn to Problem 6 only after you have finished with all others. This is an extra credit question.
6) log 2 = 0.3

Scoring:

Number	Points Available	Points Scored
1	16	
2	22	
3	18	
4	20	
5	24	
6	+	
TOTAL	100+	

Name _____ Section _____

1. (16 Points). Circle statements that are right and cross out statements that are wrong.

   a) A catalyst shifts the equilibrium towards more products.
   b) A catalyst shifts the equilibrium towards more reactants.
   c) The equilibrium constant can be changed by changes in temperature.
   d) The equilibrium constant can be changed by changes in pressure.
   e) An increase in pressure yields more products for the following reaction: $2A + B = 4C$
   f) The best conditions for maximum yield in the ammonia synthesis are low pressure and high temperature (ammonia synthesis is exothermic).
   g) The conjugate base A^- to the weak acid HA is a weak base.
   h) A 1 M HCl has pH = 1.

2. (22 Points)

2a (16 Points). For the reaction $A + 4B + 6C \rightleftharpoons 9D$, you are given 0.9 mole A, 8 mole B and 2 mole C.

   a) (4 Points). What is the limiting reagent?
   b) (6 Points). How many moles of D are produced?
   c) (6 Points). How many moles of A are left over?

2b (6 Points). For $3A + B \rightleftharpoons 2C$, $K = 0.5$. At equilibrium, 2 moles of A and 1 mole of B are detected. How many moles of C are there? (Assume a 1 liter flask for the reaction)

Name _____ Section _____

3. (18 Points)

3a (6 Points). How many grams of acid H_3A are needed to neutralize 90 g of base $B(OH)_2$? (Strong acids and bases)
Molecular weights (mole mass): H_3A 90 gmo^{-1}, $B(OH)_2$ 60 gmo^{-1}

3b (6 Points). How many grams of $B(OH)_2$ are in 2 liters of a 0.6 N solution of $B(OH)_2$?

3c (6 Points). 1 liter of 0.6 N $B(OH)_2$ is titrated to equivalence with 2 liter of H_3PO_4. What is the molarity of H_3PO_4?

4. (20 Points)

4a (6 Points). A solution of HCl has pH = 2.7. What is the molarity of HCl?

4b (8 Points). How many liters of H_2O do you have to add to 1 liter of 1 M HCl to reach pH = 3?

c (6 Points). A 0.1 M acid HA has pH = 3. What is the equilibrium constant (K_a) of the acid?

Name _____ Section _____

5. (24 Points)

5a (8 Points). What is the pH of 1 liter solution prepared from 0.1 moles of NaOH and 0.1 moles of HA ($K_a = 10^{-5}$)?

5b (8 Points). What is the pH of 1 liter solution made from 0.01 moles NaOH and 0.11 moles HA ($K_a = 10^{-5}$)?

5c (8 Points). What is the pH of 1 liter solution made from 0.1 moles of HA ($K_a = 10^{-5}$)?

6. (+, extra credit). What is the pH of a solution that is 0.01 M in NH_3 and 0.1 M in NH_4Cl? Assume $K_a = 10^{-10}$ for $NH_4^+ \rightleftarrows NH_3 + H^+$

APPENDIX C

CALCULUS MIDTERM EXAM 1

APPENDIX C

CALCULUS MIDTERM EXAM 1

Mathematics 1B Hour Examination (1)
1/31/1977

Each question is worth 25 points. Show all work and display your answers.

1. Find the following derivatives:

$\frac{d}{dx}(e^{2x+1}) =$; $\frac{d}{dx}(\log(2x+1)) =$

$\frac{d}{dx}(\log(e^{\sin x})) =$; $\frac{d}{dy}(\sin(e^{y})) =$

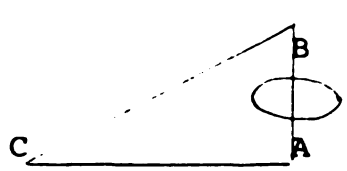
$\frac{d}{dt}(e^{\frac{1}{t}}) =$

2. $\frac{d}{dx}(\sin(x+\frac{1}{x})) =$; $\frac{d}{d\theta}(\cos(\sin\theta)) =$

$\frac{d}{dt}(\sin(\pi t)) =$; $\frac{d}{dx}(\sin^2 x + \cos^2 x) =$

$\frac{d}{dx}(\cos(e^{\log(\sin x)}) =$

3. A. Sketch carefully the graph of $x \to \sin(\pi x)$ for $0 \le x \le 1$. In particular, indicate the values of $\sin(\pi X)$ for $x = \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, \frac{3}{4}$,

B. 

AC is 10 miles and ACB is $\frac{\pi}{6}$
How long is AB?

4. A certain population of cells is 10^8 at the time $t = 0$. In two hours the population is 10^9. Write the equation for the population $y(t)$, where t is measured in hours.

APPENDIX D

CHEMISTRY MIDTERM EXAM 1

APPENDIX D

CHEMISTRY MIDTERM EXAM 1

Science 3A - 1977

First Exam Name _____

Instructions:

1) Write your name and recitation section on all pages.
2) Read over all questions and work problems in order of ease.
3) The point value assigned to each question appears in parenthesis.
4) Make sure there are no pages missing in your exam booklet.
5) Turn to Problem 6 only after you have finished with all others. This is an extra credit question.
6) $R = 0.08$ liter atm K^{-1} $mole^{-1}$
   $N = 6 \times 10^{23}$

Scoring:

Number	Points Available	Points Scored
1	18	
2	20	
3	20	
4	22	
5	20	
6	+	
TOTAL	100+	

Name _____

Section _____

1a. (2 Points) - Who's done it?

Mass conservation

1b. (4 Points) - What is the fusion reaction in the sun?

1c. (4 Points) - How many protons and neutrons are there in ^{3}He?

1d. (8 Points) - How many atoms are there in 1 g of element ^{50}E?

2a. (8 Points) - If one gram of metal reacts with 2 g of ^{16}O, what is the equivalent weight (equivalent mass) of the metal?

2b. (12 Points) - Assume 6 g ^{12}C form a compound CO_2 with an unknown amount of oxygen. What is this amount of $^{16}O_2$ in grams? What is the density of CO_2 gas at STP?

Name _____

Section _____

3a. (10 Points) - Assume an 8 liter glass container explodes when it reaches a pressure of 10 atm. At what temperature will the container explode when 4 g H_2 are enclosed?

3b. (10 Points) - What is the molecular weight (mole mass) of a gas, 0.2 grams of which are enclosed in 0.8 liters at 300 K exerting a pressure of 10 atm?

4a. (12 Points) - Assume O_2 has a velocity (root mean square velocity) of 500 ms^{-1} at 300 K. At what temperature will it have a velocity of 2000 ms^{-1}?

Name _____

Section _____

4b. (10 Points) - Assume a 1 molal aqueous solution of $CaCl_2$ to have a freezing point of -3°C. What then is the freezing point of a 0.1 molal solution of NaCl

5a. (12 Points) - An electric current separates 64 g Cu out of a solution of $CuCl_2$ in 1200 seconds. For how many seconds will you have to let this current flow through an aqueous solution of $CrCl_3$ to separate 10.6 g Cr at weight Cu 64 and Cr 53?

5b. (8 Points) - Order the following ions in order of increasing deflections in a mass spectrometer (put strongly deflected ions right): O^+ , O^{2+} , He^+

6+ (Extra credit) - You want to lift 54 kg with a hydrogen balloon. What volume do you need at 300 K and 1 atm? Average molecular weight of air = 29 g $mole^{-1}$

APPENDIX E

COVER LETTER

APPENDIX E

COVER LETTER

UNIVERSITY OF CALIFORNIA, SAN DIEGO

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO

SANTA BARBARA • SANTA CRUZ

OFFICE OF ACADEMIC SUPPORT
AND INSTRUCTIONAL SERVICES

LA JOLLA, CALIFORNIA 92093

January 28, 1977

Dear Class Member:

Questions? Call OASIS--X3760--Carmel Myers

Your participation in the project described on the next page is essential and valuable to me. The written description of your task is meant to be readily understandable. However, if the description is not totally clear, I urge you to call me at OASIS at 452-3760 if you have any questions about the task. Please do not talk with your friends and fellow students about the directions.

Confidentiality

Not only is your participation essential, but so is your confidentiality. I must request your cooperation during the next three weeks and ask that you do not discuss your particular task with other class members or friends. Different members of the class will be providing me with different types of information. It is important that the information I receive from you reflects solely your point of view and the task you've been assigned. As soon as I have summarized the information I have receive from you, I will prepare a written report and invite you to a meeting where we can discuss the project.

You can earn $50.00!

The project requires you to provide me with information each week. For each week you complete and return your assigned task, a token with your code number will be placed in a large jar. You must participate every week and complete all the tasks for your tokens to remain in the jar. At the end of the project, a drawing will be held and if your token is drawn you will receive a crisp $50 bill! Good luck to you and thank you for your assistance.

Sincerely,

Carmel Myers
Assistant Director

DM:jl

APPENDIX F

SM INSTRUCTION SHEET

APPENDIX F

SM INSTRUCTION SHEET

UNIVERSITY OF CALIFORNIA, SAN DIEGO

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO — SANTA BARBARA • SANTA CRUZ

OFFICE OF ACADEMIC SUPPORT
AND INSTRUCTIONAL SERVICES

LA JOLLA, CALIFORNIA 92093

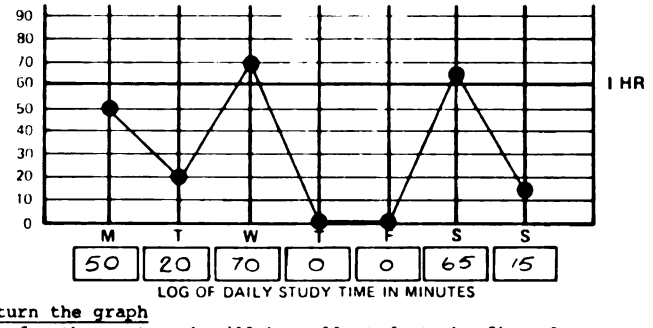
Students' problems in class sometimes result from inadequate amounts of study time. It is important for us to know the typical amount of time spent daily in studying for this class if we are to give reasonable advice and assistance to those who request it. You are part of a group of students who have been randomly chosen to assist in determining this average by recording daily the time you spend in this class.

WHAT to record
Please add up all the time you spend each day on reading, outlining, working problems, and so on for this class. Please do not count the time you spend in class in your daily summary. If you do not spend any time on a given day, record that also. Please make certain your record is complete, honest and accurate.

WHEN to record
Record your total study time each day as soon as you have finished all the work you will do that day in this class. If you do not spend any time, record that at the end of the day.

WHERE
Graph report forms are attached to this explanation. The steps to be completed are listed here.

1. Record on the line labeled "Log of Daily Study Time" the total amount of time you spent that day on this class in minutes.
2. Plot your time on the graph. Put a dot across from the number of minutes you studied that day on the line for that day. Connect the dots as the week goes on. An example is shown below.



LOG OF DAILY STUDY TIME IN MINUTES

HOW to return the graph
Your graph for the past week will be collected at the first lecture session each week. Specific due dates are written on the graphs.

GENERAL INFORMATION
It is important for you to know that the information you provide about study time is confidential and your graph reports are coded to assure such confidentiality. Your instructor will not see any of the information you provide in the graphs and your grade will not be influenced in any way by your participation in this investigation. Your full cooperation and assistance with this study are essential and appreciated very much.

APPENDIX G

SM+C INSTRUCTION SHEET

APPENDIX G

SM+C INSTRUCTION SHEET

UNIVERSITY OF CALIFORNIA, SAN DIEGO

BERKELEY · DAVIS · IRVINE · LOS ANGELES · RIVERSIDE · SAN DIEGO · SAN FRANCISCO — SANTA BARBARA · SANTA CRUZ

OFFICE OF ACADEMIC SUPPORT
AND INSTRUCTIONAL SERVICES

LA JOLLA, CALIFORNIA 92093

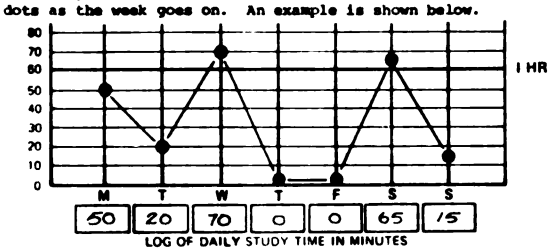
Students' problems in class sometimes result from inadequate amounts of study time. It is important for us to know the typical amount of time spent daily in studying for this class if we are to give reasonable advice and assistance to those who request it. You are a part of a group of students who have been randomly chosen to assist in determining this average by recording daily the time you spend in this class.

WHAT to record
Please add up all the time you spend each day on reading, outlining, working problems, and so on for this class. Please do not count the time you spend in class in your daily summary. If you do not spend any time on a given day, record that also. Please make certain your record is complete, honest and accurate.

WHEN to record
Record your total study time each day as soon as you have finished all the work you will do that day in this class. If you do not spend any time, record that at the end of the day.

WHERE to record
Graph report forms are attached to this explanation. The steps to be completed are listed here.

1. Record on the line labeled "Log of Daily Study Time" the total amount of time you spent that day on this class in minutes.
2. Plot your time on the graph. Put a dot across from the number of minutes you studied that day on the line for that day. Connect the dots as the week goes on. An example is shown below.



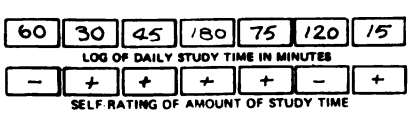
LOG OF DAILY STUDY TIME IN MINUTES

HOW to return the graph
Your graph for the past week will be collected at the first lecture session each week. Specific due dates are written on the graphs.

SELF EVALUATION
On your graph below the line labeled "Log of Daily Study Time" is space for you to rate the amount of time you spent on this course each day. Your self-rating should be based on your own opinion and standards. For example, if you think the amount of time you spend on this particular class was adequate, you should give a positive (+) rating. If you do not think the time was adequate, you should give a negative (-) rating. Record one of the symbols below each day and please do not leave any days blank.

positive +
negative -

It is important that your self-rating be based on the amount of study time for the day and not the quality of the time spent. An example is shown below.



GENERAL INFORMATION
It is important for you to know that the information you provide about study time is confidential and your graph reports are coded to assure such confidentiality. Your instructor will not see any of the information you provide in the graphs and your grade will not be influenced in any way by your participation in this investigation. Your full cooperation and assistance with this study are essential and appreciated very much.

APPENDIX H

CONTROL INSTRUCTION SHEET

APPENDIX H

CONTROL INSTRUCTION SHEET

UNIVERSITY OF CALIFORNIA, SAN DIEGO

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

OFFICE OF ACADEMIC SUPPORT
AND INSTRUCTIONAL SERVICES

LA JOLLA, CALIFORNIA 92093

We are attempting to learn about the kinds of activities or experiences which students have outside of class that are equal to or greater in importance to course work. You are part of a group of students who have been randomly chosen to assist in providing this information.

Please use the attached report forms to provide the necessary information. Your form for the past week will be collected at the first lecture session each week. Specific due dates are written on each form.

It is important for you to know that the information you provide is confidential and your report forms are coded to assure such confidentiality. Your instructor will not see any of the information you provide and your grade will not be influenced in any way by your participation in this investigation. Your full cooperation and assistance with this study are essential and appreciated very much.

APPENDIX I

SM REPORT FORM

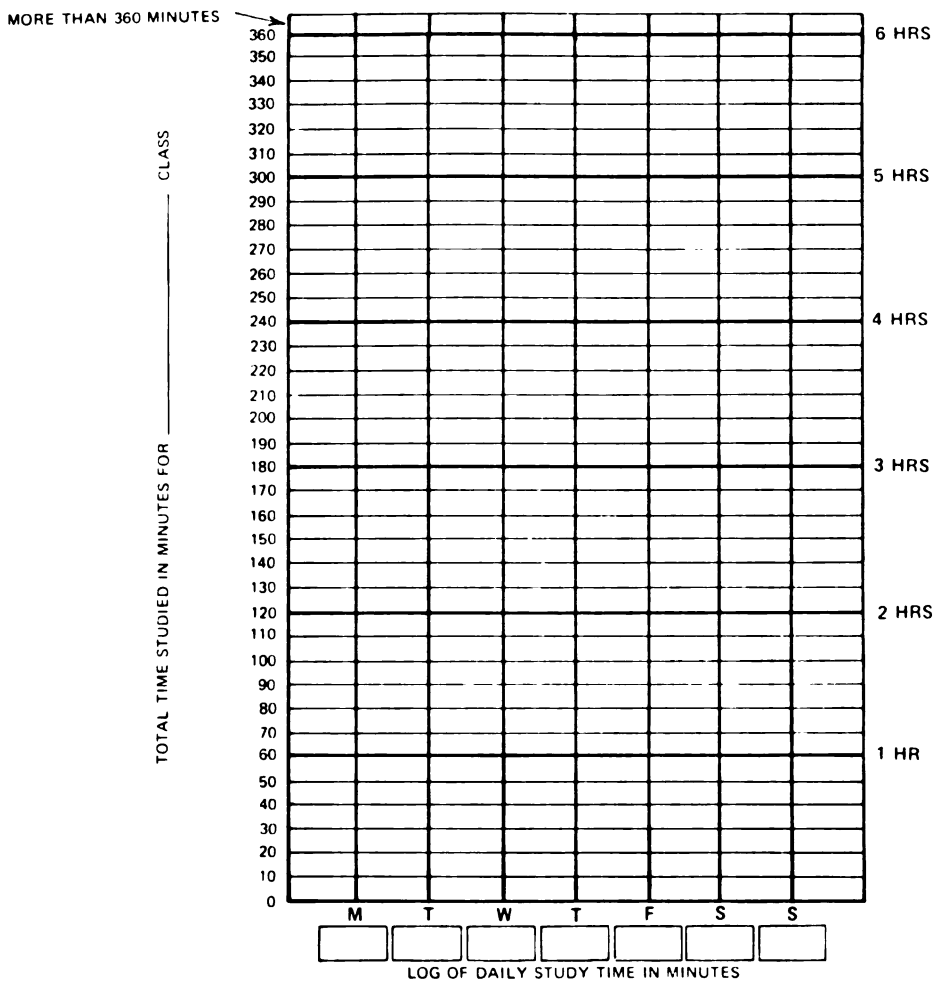
APPENDIX I

SM REPORT FORM

CODE NUMBER _____

GRAPH NUMBER _____

DAY AND DATE DUE IN CLASS _____



NOTE: IF TIME STUDIED IN THIS ONE CLASS EXCEEDS 360 MINUTES (6 HOURS) LOG EXACT AMOUNT

$50.00 TOKEN $50.00

CODE NO. _____

APPENDIX J

SM+C REPORT FORM

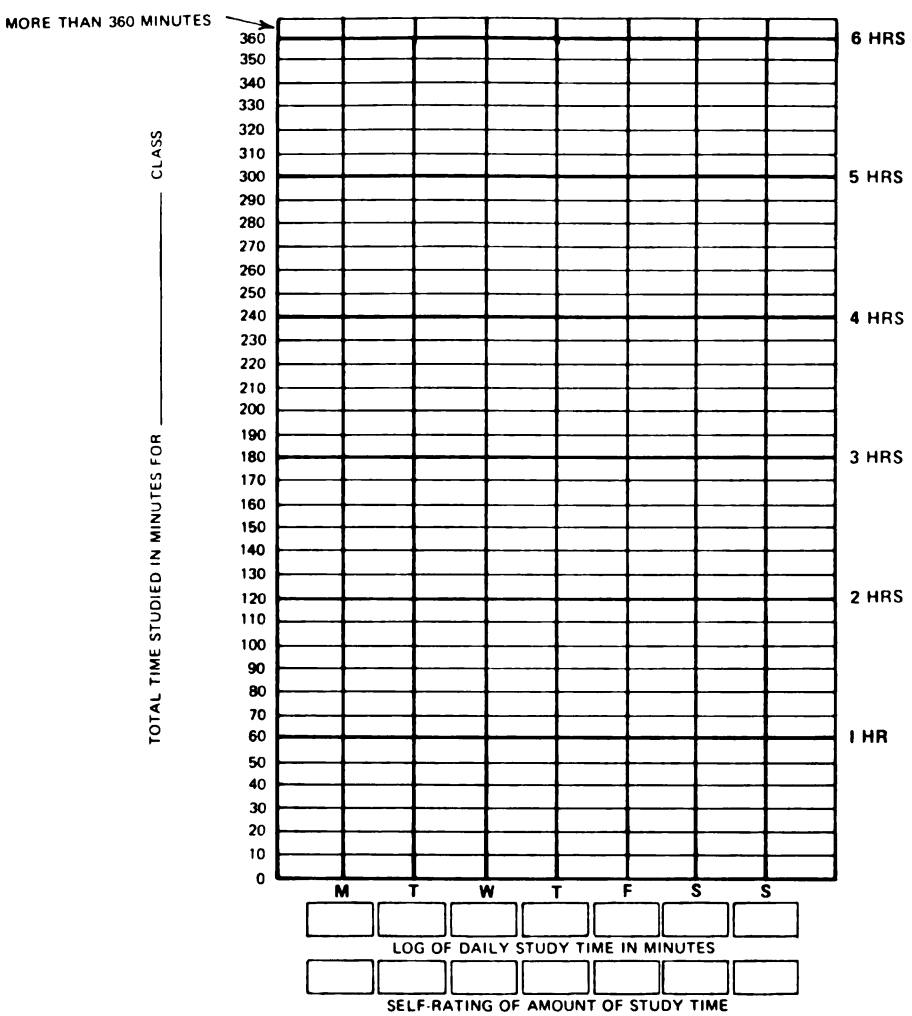
APPENDIX J

SM+C REPORT FORM

CODE NUMBER _____

GRAPH NUMBER _____

DAY AND DATE DUE IN CLASS _____



NOTE: IF TIME STUDIED IN THIS ONE CLASS EXCEEDS 360 MINUTES (6 HOURS) LOG EXACT AMOUNT

$50.00 TOKEN $50.00

CODE NO. _____

APPENDIX K

CONTROL REPORT FORM

APPENDIX K

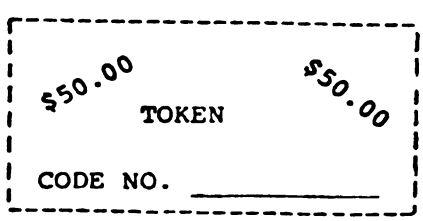
CONTROL REPORT FORM

Code Number _____

Report Number _____

Day and date
due in class _____

Please describe in a few sentences an experience or activity for this week that you consider to be of equal or greater importance compared to your work in classes.



APPENDIX L

SM QUESTIONNAIRE

APPENDIX L

SM QUESTIONNAIRE

PLEASE CIRCLE THE RESPONSE THAT DESCRIBES YOUR BEHAVIOR DURING THIS PROJECT:

Code Number _____

Day and date due _____

(Return with graph #3)

1.	Each day I recorded the amount of time I studied for this class.	Always	Usually	Rarely	Never
2.	In addition, each day I graphed the time I spent in this class.	Always	Usually	Rarely	Never
3.	I included in my study time totals time spent reading, working problems, outlining, and so on.	Always	Usually	Rarely	Never
4.	I excluded class time in my daily totals of study time.	Always	Usually	Rarely	Never
5.	I avoided discussions of the project with other classmates.	Always	Usually	Rarely	Never
6.	I recorded the amount of time I studied for this class as soon as I finished studying or at the end of each day.	Always	Usually	Rarely	Never
7.	I encouraged other students in my class who were not assigned the project to try graphing their study time.	Always	Usually	Rarely	Never
8.	My record of time studied was honest.	Always	Usually	Rarely	Never
9.	When I didn't study in a given day I recorded 0 in the daily study time log.	Always	Usually	Rarely	Never
10.	I believe I studied more for this class as a result of this project.	Agree Strongly	Agree	Disagree	Disagree Strongly
11.	I will continue to record and graph my study time in this class.	Agree Strongly	Agree	Disagree	Disagree Strongly
12.	I will try recording and graphing my study time in other classes.	Agree Strongly	Agree	Disagree	Disagree Strongly
13.	Additional comments or suggestions. (Please use back of page as well).				

APPENDIX M

SM+C QUESTIONNAIRE

APPENDIX M

SM+C QUESTIONNAIRE

PLEASE CIRCLE THE RESPONSE THAT DESCRIBES YOUR BEHAVIOR DURING THIS PROJECT:

Code Number _____

Day and Date Due _____
(Return with graph #3)

1.	Each day I recorded the amount of time I studied for this class.	Always	Usually	Rarely	Never
2.	In addition, each day I graphed the time I spent in this class.	Always	Usually	Rarely	Never
3.	I included in my study time totals time I spent reading, working problems, outlining, and so on.	Always	Usually	Rarely	Never
4.	I excluded class time in my daily totals of study time.	Always	Usually	Rarely	Never
5.	I avoided discussions of the project with other classmates.	Always	Usually	Rarely	Never
6.	I rated the amount of time I spent on this class with either a + or - each day.	Always	Usually	Rarely	Never
7.	I recorded the amount of time I studied for this class as soon as I finished studying or at the end of each day.	Always	Usually	Rarely	Never
8.	I rated the amount of time I studied for this class when I recorded the amount.	Always	Usually	Rarely	Never
9.	My rating was based on my own opinion of what amount of time was adequate for the day.	Always	Usually	Rarely	Never
10.	I encouraged other students in my class who were not assigned the project to try graphing their study time.	Always	Usually	Rarely	Never
11.	I also encouraged other students not assigned the project to rate their study time.	Always	Usually	Rarely	Never
12.	My record of time studied was honest.	Always	Usually	Rarely	Never
13.	When I didn't study on a given day I recorded 0 in the daily study time log.	Always	Usually	Rarely	Never
14.	I believe I studied more for this class as a result of this project.	Agree Strongly	Agree	Disagree	Disagree Strongly
15.	I will continue to record and graph my study time in this class.	Agree Strongly	Agree	Disagree	Disagree Strongly
16.	I will try recording and graphing my study time in other classes.	Agree Strongly	Agree	Disagree	Disagree Strongly
17.	Additional comments or suggestions. (Please use back of page).				

LIST OF REFERENCES

LIST OF REFERENCES

Aronfreed, J. Conduct and conscience: The socialization and internalized control over behavior. New York: Academic Press, 1968.

Axelrod, S., Hall, R. V., Weis, L., & Rohrer, S. Use of self-imposed contingencies to reduce the frequency of smoking behavior. In M. J. Mahoney & C. E. Thoreson (Eds.), Self-control: Power to the person. Monterey, Cal.: Brooks/Cole, 1974.

Balfour, J. D. A comparison of the effects of external control in the modification and maintenance of weight. Journal of Abnormal Psychology, 1974, 83, 404-410.

Balfour, J. D., & Christenson, E. R. Behavior therapy versus willpower in the management of obesity. Journal of Psychology, 1975, 90, 303-311.

Ballard, K. D., & Glynn, T. E. Behavioral self-management in story writing with elementary school children. Journal of Applied Behavior Analysis, 1975, 8, 387-398.

Bandura, A. Principles of behavior modification. New York: Holt, Rinehart, Winston, 1969.

Bandura, A. Vicarious and self-reinforcement processes. In R. Glaser (Ed.), The nature of reinforcement. New York: Academic Press, 1971.

Bandura, A. Behavior theory and the models of man. American Psychologist, 1974, 12, 859-869. (a)

Bandura, A. The case of the mistaken dependent variable. Journal of Abnormal Psychology, 1974, 83, 301-303. (b)

Bandura, A. Self-reinforcement: Theoretical and methodological considerations. Behaviorism, 1976, 4, 135-155.

Bandura, A. Social learning theory. Englewood Cliffs, N.J.: Prentice Hall, 1977.

Bandura, A., Grusec, J. E., & Menlove, F. L. Some social determinants of self-monitoring reinforcement systems. Journal of Personality and Social Psychology, 1967, 5, 449-455.

Bandura, A., & Kupers, C. J. Transmission of patterns of self-reinforcement through modeling. Journal of Abnormal and Social Psychology, 1964, 69, 1-9.

Bandura, A., & Mischel, W. Modification of self-imposed delay of reward through exposure to live and symbolic models. Journal of Personality and Social Psychology, 1965, 2, 698-705.

Bandura, A., & Perloff, B. Relative efficacy of self-monitored and externally imposed reinforcement systems. Journal of Personality and Social Psychology, 1967, 7, 111-116.

Bandura, A., & Walters, R. H. Acquisition of self-control through modeling. In R. C. Johnson, P. R. Dokecki, & O. H. Mowrer (Eds.), Conscience, contract and social reality. New York: Holt, Rinehart, & Winston, 1972.

Bandura, A., & Whalen, C. K. The influence of antecedent reinforcement and divergent modeling cues on patterns of self-reward. Journal of Personality and Social Psychology, 1966, 3, 373-382.

Bass, B. A. Reinforcement history as a determinant of self-reinforcement. Journal of Psychology, 1972, 81, 195-203.

Bellack, A. S. Internal vs. external locus of control and the use of self-reinforcement. Psychological Reports, 1972, 31, 723-733.

Bellack, A. S. A comparison of self-reinforcement and self-monitoring in a weight reduction program. Behavior Therapy, 1976, 7, 68-75.

Bellack, A. S., Glanz, L. M., & Simon, R. Self-reinforcement style and covert imagery in the treatment of obesity. Journal of Consulting and Clinical Psychology, 1976, 44, 490-491.

Bellack, A. S., Rozensky, R., & Schwartz, J. A comparison of two forms of self-monitoring in a behavioral weight reduction program. Behavior Therapy, 1974, 5, 523-530.

Bellack, A. S., Schwartz, J., & Rozensky, R. H. The contribution of external control to self-control in a weight reduction program. Journal of Behavior Therapy and Experimental Psychiatry, 1974, 5, 245-250.

Bem, S. L. Verbal self-control: The establishment of effective self-instruction. Journal of Experimental Psychology, 1967, 74, 485-491.

Beneke, M., & Harris, M. B. Teaching self-control of study behavior. Behavior Research and Therapy, 1972, 10, 35-41.

Berecz, J. Modification of smoking behavior through self-administered punishment of imagined behavior: A new approach to aversion therapy. Journal of Consulting and Clinical Psychology, 1972, 38, 244-250.

Bolstad, O. D., & Johnson, S. M. Self-regulation in the modification of disruptive classroom behavior. In M. J. Mahoney & C. E. Thoreson, Self-control: Power to the person. Monterey, Cal.: Brooks/Cole, 1974.

Bristol, M. M., & Sloane, H. N. Effect of contingency contracting on study rate and test performance. Journal of Applied Behavior Analysis, 1974, 7, 271-285.

Broden, M., Hall, R. V., & Mitts, B. The effect of self-recording on the classroom behavior of two eighth grade students. Journal of Applied Behavior Analysis, 1971, 4, 191-199.

Catania, A. C. The myth of self-reinforcement. Behaviorism, 1975, 3, 192-199.

Cavior, N., & Marabotto, C. M. Monitoring verbal behaviors in dyadic interaction. Journal of Consulting and Clinical Psychology, 1976, 44, 68-76.

Colle, H. A., & Bee, H. L. The effects of competence and social class on degree of modeling of self-reward patterns. Psychonomic Science, 1968, 10, 231-232.

Davison, G. C. Self-control through "imaginal aversive contingency" and "one-downmanship": Enabling the powerless to accommodate unreasonableness. In J. D. Krumboltz & C. E. Thoreson (Eds.), Behavioral counseling: Cases and techniques. New York: Holt, Rinehart, & Winston, 1969.

Dorsey, T. E., Kanfer, F. H., & Duerfeldt, P. H. Task difficulty and non-contingent reinforcement schedules as factors in self-reinforcement. Journal of General Psychology, 1971, 84, 323-334.

Drabman, R. S., Spitalnik, R., & O'Leary, K. D. Teaching self-control to disruptive children. Journal of Abnormal Psychology, 1973, 82, 10-16.

Epstein, L. H., Miller, P. M., & Webster, J. S. The effects of reinforcing concurrent behavior on self-monitoring. Behavior Therapy, 1976, 7, 89-95.

Epstein, L. H., Webster, J. S., & Miller, P. M. Accuracy and controlling effects of self-monitoring as a function of concurrent responding and reinforcement. Behavior Therapy, 1975, 6, 654-666.

Felixbrod, J. J., & O'Leary, K. D. Effects of reinforcement on children's academic behavior as a function of self-determined and externally imposed contingencies. Journal of Applied Behavior Analysis, 1973, 6, 241-250.

Felixbrod, J. J., & O'Leary, K. D. Self-determination of academic standards by children: Toward freedom from external control. Journal of Educational Psychology, 1974, 66, 845-850.

Fink, W. T., & Carnine, D. W. Control of arithmetic errors using informational feedback and graphing. Journal of Applied Behavior Analysis, 1975, 8, 461.

Fox, L. Effecting the use of efficient study habits. In R. Ulrich, T. Stachnik, & J. Mabry (Eds.), Control of Human Behavior. Glenview, Ill.: Scott, Foresman, 1966.

Frederiksen, L. W. Treatment of ruminative thinking by self-monitoring. Journal of Behavior Therapy and Experimental Psychiatry, 1975, 6, 258-259.

Frederiksen, L. W., Epstein, L. H., & Kosevsky, B. P. Reliability and controlling effects of three procedures for self-monitoring smoking. Psychological Record, 1975, 25, 255-263.

Gewirtz, J. L. The roles of overt responding and extrinsic reinforcement in "self-" and "vicarious-reinforcement" phenomena and in "observational learning" and imitation. In R. Glaser (Ed.), The nature of reinforcement. New York: Academic Press, 1971.

Glynn, E. L. Classroom applications of self-determined reinforcement. Journal of Applied Behavior Analysis, 1970, 3, 123-132.

Glynn, E. L., & Thomas, J. D. Effect of cueing on self-control of classroom behavior. Journal of Applied Behavior Analysis, 1974, 7, 299-306.

Glynn, E. L., Thomas, J. D., & Shee, S. M. Behavioral self-control of on-task behavior in an elementary school. Journal of Applied Behavior Analysis, 1973, 6, 105-113.

Goldiamond, I. Self-control procedures in personal behavior problems. Psychological Reports, 1965, 17, 851-868.

Goldiamond, I. Fables, armadyllics, and self-reinforcement. Journal of Applied Behavior Analysis, 1976, 9, 521-525. (a)

Goldiamond, I. Self-reinforcement. Journal of Applied Behavior Analysis, 1976, 9, 509-514. (b)

Gottman, J. M., & McFall, R. M. Self-monitoring effects in a program for potential high school dropouts: A time series analysis. Journal of Consulting and Clinical Psychology, 1972, 39, 273-281.

Gulanick, N., Woodburn, L. T., & Rimm, D. C. Weight gain through self-control procedures. Journal of Consulting and Clinical Psychology, 1975, 43, 536-539.

Hall, H. V. Effects of direct and self-reinforcement as a function of internal-external control. Perceptual and Motor Skills, 1973, 37, 753-754.

Hall, S. M. Self-control and behaviorist control in the behavioral treatment of overweight women. Behavior Research and Therapy, 1972, 10, 59-68.

Hall, S. M. Behavioral treatment of obesity: A two year follow-up. Behavior Research and Therapy, 1973, 11, 647-648.

Harris, M. B. Self-directed program for weight control: A pilot study. Journal of Abnormal Psychology, 1969, 74, 263-270.

Harris, M. B., & Trujillo, A. E. Improving study habits of junior high school students through self-management versus group discussion. Journal of Counseling Psychology, 1975, 22, 513-517.

Haynes, L. E., & Kanfer, F. H. Academic rank, task feedback, and self-reinforcement in children. Psychological Reports, 1971, 28, 967-974.

Heldebrandt, D. E., Feldman, S. E., & Ditrichs, R. A. Rules, models, and self-reinforcement in children. Journal of Personality and Social Psychology, 1973, 25, 1-5.

Herbert, E. W., & Baer, D. M. Training parents as behavior modifiers: Self-recording of contingent attention. Journal of Applied Behavior Analysis, 1972, 5, 139-149.

Herbert, E. W., Gelfand, D. M., & Hartmann, D. P. Imitation and self-esteem as determinants of self-critical behavior. Child Development, 1969, 40, 421-430.

Hill, J. H., & Liebert, R. M. Effects of consistent or deviant modeling cues on the adoption of a self-imposed standard. Psychonomic Science, 1968, 13, 243-244.

Homme, L. E. Perspectives in psychology--XXIV: Control of coverants, the operants of the mind. Psychological Record, 1965, 15, 501-511.

Hoon, P. W. Effects of self-monitoring and self-recording on ecological acts. Psychological Reports, 1976, 38, 1285-1286.

Horan, J. J., Hoffman, A. M., & Macri, M. Self-control of chronic fingernail biting. Journal of Behavior Therapy and Experimental Psychiatry, 1974, 5, 307-309.

Horan, J. J., & Johnson, R. G. Coverant conditioning through self-management application of the Premack principle: Its effect on weight reduction. Journal of Behavior Therapy and Experimental Psychiatry, 1971, 2, 243-249.

Hutzell, R. R., Platzek, D., & Logue, P. E. Control of symptoms of Gilles de la Tourettes syndrome by self-monitoring. Journal of Behavior Therapy and Experimental Psychiatry, 1974, 5, 71-76.

Jackson, B. Treatment of depression by self-reinforcement. Behavior Therapy, 1972, 3, 298-307.

Jackson, B., & Van Zoost, B. Changing study behaviors through reinforcement contingencies. Journal of Counseling Psychology, 1972, 19, 192-195.

Jackson, B., & Van Zoost, B. Self-regulated teaching of others as a means of improving study habits. Journal of Counseling Psychology, 1974, 21, 489-493.

Jason, L. A. Rapid improvement in insomnia following self-monitoring. Journal of Behavior Therapy and Experimental Psychiatry, 1975, 6, 349-350.

Jason, L. A. Self-monitoring in the treatment of nose squeezing and daydreaming. Psychological Reports, 1976, 38, 235-238.

Jeffrey, D. Self-control: Methodological issues and research trends. In M. J. Mahoney & C. E. Thoreson, Self-control: Power to the person. Monterey, Cal.: Brooks/Cole, 1974.

Johnson, S. M. Effects of self-reinforcement and external reinforcement in behavior modification. Proceedings of the 77th Annual Convention of the American Psychological Association, 1969, 4 (Pt. 2), 535-536.

Johnson, S. M. Self-reinforcement versus external reinforcement in behavior modification with children. Developmental Psychology, 1970, 3, 147-148.

Johnson, S. M., & Martin, S. Developing self-evaluation as a conditioned reinforcer. In B. S. Ashem & E. G. Poser (Eds.), Behavior modification with children. New York: Pergamon, 1973.

Johnson, S. M., & White, G. Self observation as an agent of behavioral change. Behavior Therapy, 1971, 2, 488-497.

Kanfer, F. H. Influence of age and incentive conditions on children as self-rewards. Psychological Reports, 1966, 19, 263-274.

Kanfer, F. H. Self-monitoring: Methodological limitations and clinical applications. Journal of Consulting and Clinical Psychology, 1970, 35, 148-152.

Kanfer, F. H. Self-management methods. In F. H. Kanfer & A. P. Goldstein (Eds.), Helping people change. New York: Pergamon, 1975.

Kanfer, F. H., Bradley, M. M., & Marston, A. R. Self-reinforcement as a function of degree of learning. Psychological Reports, 1962, 10, 885-886.

Kanfer, F. H., Cox, L. E., Greiner, J. M., & Karoly, P. Contracts, demand characteristics, and self-control. Journal of Personality & Social Psychology, 1974, 30, 605-619.

Kanfer, F. H., & Duerfeldt, P. H. Effects of pretraining on self-evaluation and self-reinforcement. Journal of Personality and Social Psychology, 1967, 7, 164-168. (a)

Kanfer, F. H., & Duerfeldt, P. H. Effects on retention of externally or self-reinforced rehearsal trials following acquisition. Psychological Reports, 1967, 21, 194-196. (b)

Kanfer, F. H., & Duerfeldt, P. H. Motivational properties of self-reinforcement. Perceptual and Motor Skills, 1967, 25, 237-246. (c)

Kanfer, F. H., & Duerfeldt, P. H. Comparison of self-reward and self-criticism as a function of types of prior external reinforcement. Journal of Personality and Social Psychology, 1968, 8, 261-268.

Kanfer, F. H., Duerfeldt, P. H., & LePage, A. L. Stability of patterns of self-reinforcement. Psychological Reports, 1969, 24, 663-670.

Kanfer, F. H., & Marston, A. R. Conditioning of self-reinforcing responses: An analogue to self-confidence training. Psychological Reports, 1963, 13, 63-70. (a)

Kanfer, F. H., & Marston, A. R. Determinants of self-reinforcement in human learning. Journal of Experimental Psychology, 1963, 66, 245-254. (b)

Karoly, P., & Doyle, W. W. Effects of outcome expectancy and timing of self-monitoring on cigarette smoking. Journal of Clinical Psychology, 1975, 31, 351-355.

Karoly, P., & Kanfer, F. H. Situational and historical determinants of self-reinforcement. Behavior Therapy, 1974, 5, 381-390.

Kaufman, K. F., & O'Leary, K. D. Reward, cost, and self-evaluation procedures for disruptive adolescents in a psychiatric hospital. Journal of Applied Behavior Analysis, 1972, 5, 293-309.

Kazdin, A. E. Reactive self-monitoring: The effects of response desirability, goal-setting, and feedback. Journal of Consulting and Clinical Psychology, 1974, 42, 704-716. (a)

Kazdin, A. E. Self-monitoring and behavior change. In M. J. Mahoney & C. E. Thoreson, Self-control: Power to the person. Monterey, Cal.: Brooks/Cole, 1974. (b)

Lanyon, R. I., & Barocas, V. S. Effects of contingent events on stuttering and fluency. Journal of Consulting and Clinical Psychology, 1975, 43, 786-793.

Leitenberg, H., Agras, W. S., Thomson, L. E., & Wright, D. E. Feedback in behavior modification: An experimental analysis in two phobic cases. Journal of Applied Behavior Analysis, 1968, 1, 131-137.

Liebert, R. M., & Allen, M. K. Effects of rule structure and reward magnitude on the acquisition and adoption of self-reward criteria. Psychological Reports, 1967, 21, 445-452.

Liebert, R. M., Hanratty, M., & Hill, J. H. Effects of rule structure and training method on the adoption of self-imposed standard. Child Development, 1969, 40, 93-101.

Liebert, R. M., & Ora, J. P. Children's adoption of self-reward patterns: Incentive level and method of transmission. Child Development, 1968, 39, 537-544.

Liebert, R. M., Spiegler, M. D., & Hall, W. M. Effects of the value of contingent self-administered and noncontingent externally imposed reward on children's behavioral productivity. Psychonomic Science, 1970, 18, 245-246.

Lipinski, D. P., Black, J. L., Nelson, R. O., & Ciminero, A. R. Influence of motivational variables on the reactivity and reliability of self-recording. Journal of Consulting and Clinical Psychology, 1975, 43, 637-646.

Lipinski, D., & Nelson, R. The reactivity and unreliability of self-recording. Journal of Consulting and Clinical Psychology, 1974, 42, 118-123.

Lovitt, T. C., & Curtiss, K. A. Academic response rate as a function of teacher and self-imposed contingencies. Journal of Applied Behavior Analysis, 1969, 2, 49-54.

Mahoney, M. J. The self management of covert behavior: A case study. Behavior Therapy, 1971, 2, 575-578.

Mahoney, M. J. Self-reward and self-monitoring techniques for weight control. Behavior Therapy, 1974, 5, 48-57.

Mahoney, M. J. Terminal terminology: A self-regulated response to Goldiamond. Journal of Applied Behavior Analysis, 1976, 9, 515-517.

Mahoney, M. J., Kazdin, A. E., & Lesswing, N. J. Behavior modification: Delusion or deliverance. In D. M. Franks & G. T. Wilson (Eds.), Annual review of behavior therapy: Theory practice. New York, N.Y.: Brunner/Mazel, 1974.

Mahoney, M. J., Moore, B. S., Wade, T. C., & Moura, N. G. Effects of continuous and intermittent self-monitoring on academic behavior. Journal of Consulting and Clinical Psychology, 1973, 41, 65-69.

Mahoney, M. J., Moura, N. G., & Wade, T. C. Relative efficacy of self-reward, self-punishment, and self-monitoring techniques for weight loss. Journal of Consulting and Clinical Psychology, 1973, 40, 404-407.

Maletzky, B. M. Behavior recording as treatment: A brief note. Behavior Therapy, 1974, 5, 107-111.

Marston, A. R. Personality variables related to self-reinforcement. Journal of Psychology, 1964, 58, 169-175. (a)

Marston, A. R. Response strength and self-reinforcement. Journal of Experimental Psychology, 1964, 68, 537-540. (b)

Marston, A. R. Imitation, self-reinforcement and external reinforcement of another person. Journal of Personality and Social Psychology, 1965, 2, 255-261.

Marston, A. R. Self-reinforcement and external reinforcement in visual-motor learning. Journal of Experimental Psychology, 1967, 74, 93-98.

Marston, A. R. Effect of external feedback on the rate of positive self-reinforcement. Journal of Experimental Psychology, 1969, 80, 175-179.

Marston, A. R., & Cohen, N. J. The relationship of negative self-reinforcement to frustration and intropunitiveness. Journal of General Psychology, 1966, 74, 237-243.

Marston, A. R., & Kanfer, F. H. Human reinforcement: Experimental and subject controlled. Journal of Experimental Psychology, 1963, 66, 91-94.

Marston, A. R., & Smith, F. J. Relationship between reinforcement of another person and self-reinforcement. Psychological Reports, 1968, 22, 83-90.

Martin, J. E., & Sachs, D. A. The effects of a self-control weight loss program on an obese woman. Journal of Behavior Therapy and Experimental Psychiatry, 1973, 4, 155-159.

Masters, J. C. Effects of social comparison upon subsequent self-reinforcement behavior in children. Journal of Personality and Social Psychology, 1968, 10, 391-401.

Masters, J. C. Social comparison, self-reinforcement, and the value of a reinforcer. Child Development, 1969, 40, 1027-1038.

Masters, J. C. Effects of social comparison upon children's self-reinforcement and altruism toward competitors and friends. Developmental Psychology, 1971, 5, 64-72.

Masters, J. C. Effects of success, failure, and reward outcome upon contingent and noncontingent self-reinforcement. Developmental Psychology, 1972, 7, 110-118.

Masters, J. C. Effects of age and social comparison upon children's noncontingent self-reinforcement and the value of a reinforcer. Child Development, 1973, 44, 111-116.

Masters, J. C., & Christy, M. D. Achievement standards for contingent self-reinforcement: Effects of task length and task difficulty. Child Development, 1974, 45, 6-13.

McFall, R. M. Effects of self-monitoring on normal smoking behavior. Journal of Consulting and Clinical Psychology, 1970, 35, 135-142.

McFall, R. M., & Hammen, C. L. Motivation, structure, and self-monitoring: Role of nonspecific factors in smoking reduction. Journal of Consulting and Clinical Psychology, 1971, 37, 80-86.

McKeachie, W. J. The decline and fall of the laws of learning. Educational Researcher, 1974, 3, 7-11.

McKenzie, T., & Rushall, B. Effects of self-recording on attendance and performance in a competitive swimming training environment. Journal of Applied Behavior Analysis, 1974, 7, 199-206.

McLaughlin, T. F. Self-control in the classroom. Review of Educational Research, 1976, 46, 631-663.

McReynolds, W. T., & Church, A. Self-control, study skills development and counseling approaches to the improvement of study behavior. Behavior Research and Therapy, 1973, 11, 233-235.

Meichenbaum, D. H. Cognitive factors in behavior modification: Modifying what clients say to themselves. In C. M. Franks & G. T. Wilson (Eds.), Annual Review of Behavior Therapy: Theory and Practice. New York, N.Y.: Brunner/Mazel, 1973.

Meichenbaum, D. H., & Goodman, J. Training impulsive children to talk to themselves: A means for developing self-control. Journal of Abnormal Psychology, 1971, 77, 115-126.

Mendelsohn, M. B. Nonautonomous free man. Behaviorism, 1975, 3, 117-119.

Miller, A. W., & Clark, N. Self-reinforcement established for a descrimination task. Journal of Genetic Psychology, 1970, 117, 1-6.

Miller, A. W., & Gimpl, M. Operant conditioning and self-control of smoking and studying. Journal of Genetic Psychology, 1971, 119, 181-186.

Mischel, W., & Liebert, R. M. Effects of discrepancies between observed and imposed reward criteria on their acquisition and transmission. Journal of Personality and Social Psychology, 1966, 3, 45-53.

Mischel, W., & Liebert, R. M. The role of power in the adoption of self-reward patterns. Child Development, 1967, 38, 673-683.

Montgomery, G. T., & Parton, D. H. Reinforcing effect of self-reward. Journal of Experimental Psychology, 1970, 84, 273-276.

Moser, A. J. Covert punishment of hallucinatory behavior in a psychotic male. Journal of Behavior Therapy and Experimental Psychiatry, 1974, 5, 297-299.

Myers, C. A. Punishment: Problems in definition. 1975. (ERIC Document Reproduction Service No. ED 105 569)

Nelson, C. M., & McReynolds, T. Self-recording and control behavior. A reply to Simkins. Behavior Therapy, 1971, 2, 594-597.

Orne, M. T. From the subject's point of view, when is behavior private and when is it public: Problems of inference. Journal of Consulting and Clinical Psychology, 1970, 35, 143-147.

Reschly, D. J. Consistency of self-reinforcement rates over different tasks; and sex, task success, and ability as determinants of rates of self-reinforcement. Psychological Record, 1973, 23, 237-242.

Reschly, D. J., & Mittman, A. The relationship of self-esteem status and task ambiguity to the self-reinforcement behavior of children. Developmental Psychology, 1973, 9, 16-19.

Richards, C. S. Behavior modification of studying through study skills advice. Journal of Counseling Psychology, 1975, 22, 431-436.

Richards, C. S., McReynolds, W. T., Holt, S., & Sexton, T. Effects of information feedback and self-administered consequences on self-monitoring study behavior. Journal of Counseling Psychology, 1976, 23, 316-321.

Robertshaw, C. S., Kelly, T. J., & Hiebert, H. D. The use of self-monitoring and contingency management techniques to increase verbal responding of an emotionally disturbed adolescent. SALT: School Applications of Learning Theory, 1974, 7, 31-36.

Robinson, F. P. Effective study (4th ed.). New York: Harper & Row, 1970.

Romanczyk, R. G. Self-monitoring in the treatment of obesity: Parameters of reactivity. Behavior Therapy, 1974, 5, 531-540.

Romanczyk, R. G., Kent, R. N., Diament, C., & O'Leary, K. D. Measuring the reliability of observational data: A reactive process. Journal of Applied Behavior Analyses, 1973, 6, 175-184.

Romancyzk, R. G., Tracey, D. A., Wilson, G. T., & Thorpe, G. A. Behavioral techniques in the treatment of obesity: A comparative analysis. Behavior Research and Therapy, 1973, 11, 629-640.

Rozensky, R. H. The effect of timing of self-monitoring behavior on reducing cigarette consumption. Journal of Behavior Therapy and Experimental Psychiatry, 1974, 5, 301-303.

Rozensky, R. H., & Bellack, A. S. Individual differences in self-reinforcement styles and performance in self- and therapist-controlled weight reduction programs. Behavior Research and Therapy, 1976, 14, 357-364.

Rutner, I. T., & Bugle, C. An experimental procedure for the modification of psychotic behavior. Journal of Consulting and Clinical Psychology, 1969, 33, 651-653.

Simkins, L. A rejoinder to Nelson and McReynolds on the self-recording of behavior. Behavior Therapy, 1971, 2, 598-601. (a)

Simkins, L. The reliability of self-recorded behaviors. Behavior Therapy, 1971, 2, 83-87. (b)

Skinner, B. F. Science and human behavior. New York: MacMillan, 1953.

Skinner, B. F. Beyond freedom and dignity. New York: Bantum Books, 1971.

Speidel, G. E. Motivating effect of contingent self-reward. Journal of Experimental Psychology, 1974, 102, 528-530.

Stollak, G. E. Weight loss obtained under different experimental procedures. Psychotherapy: Theory Research and Practice, 1967, 4, 61-64.

Stuart, R. B. Behavioral control of overeating. Behavior Research and Therapy, 1967, 5, 357-365.

Stuart, R. B. Situational versus self-control. In R. D. Rubin, H. Fensterheim, J. D. Henderson, & L. P. Ullmann (Eds.), Advances in behavior therapy. New York: Academic Press, 1972.

Stuart, R. B., & Davis, B. Slim chance in a fat world: Behavioral control of obesity. Champaign, Ill.: Research Press, 1972.

Thomas, E. J., Abrams, K. S., & Johnson, J. B. Self-monitoring and reciprocal inhibition in the modification of multiple tics of Gilles De La Tourette's syndrome. Journal of Behavior Therapy and Experimental Psychiatry, 1971, 2, 159-171.

Thoreson, C. E., & Mahoney, M. J. Behavioral self-control. New York: Holt, Rinehart, and Winston, 1974.

Thoreson, C. E., & Wilbur, C. S. Some encouraging thoughts about self-reinforcement. Journal of Applied Behavior Analysis, 1976, 9, 518-520.

Todd, F. J. Coverant control of self-evaluative responses in the treatment of depression: A new use for an old principle. Behavior Therapy, 1972, 3, 91-94.

Turkewitz, H., O'Leary, K. D., & Ironsmith, M. Generalization and maintenance of appropriate behavior through self-control. Journal of Consulting and Clinical Psychology, 1975, 43, 577-583.

Tyler, V. O., & Straughan, J. H. Coverant control and breath holding as techniques for the treatment of obesity. Psychological Record, 1970, 20, 473-478.

Wade, T. C. Relative effects on performance and motivation of self-monitoring correct and incorrect responses. Journal of Experimental Psychology, 1974, 103, 245-248.

Wasserman, H., Brown, D., & Reschly, D. Application of self-management procedures for the modification of academic and classroom behaviors of two hyperactive children. SALT: School Application of Learning Theory, 1974, 7, 17-24.

Weingartner, A. H. Self-administered aversive stimulation with hallucinating hospitalized schizophrenics. Journal of Consulting and Clinical Psychology, 1971, 36, 422-429.

Whitman, T., & Dussault, P. Self-control through the use of a token economy. Journal of Behavior Therapy and Experimental Psychiatry, 1976, 7, 161-166.

Van Zoost, B. L., & Jackson, B. T. Effects of self-monitoring and self-administered reinforcement on study behaviors. Journal of Educational Research, 1974, 67, 216-218.

General References

Aronfreed, J. The origin of self-criticism. Psychological Review, 1964, 71, 193-217.

Bandura, A. Self-reinforcement processes. In M. J. Mahoney & C. E. Thoreson, Self-control: Power to the person. Monterey, Cal.: Brooks/Cole, 1974.

Bandura, A., Mahoney, M. J., & Dirks, S. J. Discriminative activation and maintenance of contingent self-reinforcement. Behavior Research and Therapy, 1976, 14, 1-6.

Bandura, A., & Walters, R. H. Social learning and personality development. New York: Holt, Rinehart and Winston, 1963.

Barber, T. X., DiCara, L. V., Kamiya, J., Miller, N. E., Shapiro, D., & Stoyva, J. (Eds.), Biofeedback and self-control. Chicago: Aldine-Atherton, 1970.

Barber, T. X., DiCara, L. V. Kamiya, J. Miller, N. E., Shapiro, D., & Stoyva, J. Biofeedback and self-control. Chicago: Aldine-Atherton, 1975-76.

Bass, B. A., Ollendick, T. H., & Vuchinich, R. E. Study habits as a factor in the locus of control-academic achievement relationship. Psychological Reports, 1974, 34, 906.

Bernstein, D. A. Modification of smoking behavior: An evaluative review. Psychological Bulletin, 1969, 71, 418-440.

Blackwood, R. O. The operant conditioning of verbally mediated self-control in the classroom. Journal of School Psychology, 1970, 8, 251-258.

Bowersock, R. B. Contingency self-management in counseling. Journal of Counseling Psychology, 1974, 21, 265-268.

Brown, S. D. Self-control skills training. Professional Psychology, 1975, 6, 319-330.

Budd, W. C. Behavior modification: The scientific way to self-control. Roslyn Heights, N.Y.: Libra, 1973.

Cautela, J. R. Behavior therapy and self-control. In C. M. Franks (Ed.), Behavior therapy: Appraisal and status. New York: McGraw-Hill, 1969.

Cautela, J. R. Covert negative reinforcement. Journal of Behavior Therapy and Experimental Psychiatry, 1970, 1, 273-278.

Champlin, S. M., & Karoly, P. Rate of contract negotiation in self-management of study time: A preliminary investigation. Psychological Reports, 1975, 37, 724-726.

Chapman, R. F., Smith, J. W., & Layden, T. A. Elimination of cigarette smoking by punishment and self-management training. Behavior Research and Therapy, 1971, 9, 255-264.

Ferster, C. B. Classification of behavioral pathology. In L. Krasner & L. P. Ullmann (Eds.), Research in behavior modification. New York: Holt, Rinehart, & Winston, 1965.

Ferster, C., Nurnberger, J., & Levitt, D. The control of eating. Journal of Mathetics, 1962, 1, 81-109.

Foster, C. Developing self-control. Kalamazoo, Mich.: Behaviordelia, 1974.

Goldiamond, I. A diary of self-modification. Psychology Today, 1973, 7, 95-102.

Goldfried, M. R., & Merbaum, M. How to control yourself. Psychology Today, 1973, 7, 102-104.

Gray, F., Graubard, P. S., & Rosenberg, H. "Little brother is changing you." Psychology Today, 1974, 8, 42-46.

Homme, L., Csanyi, A. P., Gonzales, M. A., & Recks, J. R. How to use contingency contracting in the classroom. Champaign, Ill.: Research Press, 1969.

Jones, G. B. Improving study behaviors. In J. D. Krumboltz & C. E. Thoreson (Eds.), Behavioral counseling. New York: Holt, Rinehart, & Winston, 1969.

Kamiya, J., Barber, T. X., DiCara, L. V., Miller, N. E., Shapiro, D., & Stoyva, J. (Eds.), Biofeedback and self-control. Chicago: Aldine-Atherton, 1971.

Kanfer, F. H. Self-regulation: Research, issues, and speculations. In C. Neuringer & J. L. Michael (Eds.), Behavior modification in clinical psychology. New York: Appleton-Century-Crofts, 1970.

Kanfer, F. H. Maintenance of behavior by self-generated stimuli and reinforcement. In A. Jacobs & L. Sachs (Eds.), The psychology of private events: Perspectives on covert response systems. New York: Academic Press, 1971.

Kanfer, F. H., & Goldfoot, D. A. Self-control and tolerance of noxious stimulation. Psychological Reports, 1966, 18, 79-85.

Kanfer, F. H., & Karoly, P. Self-regulation and its clinical application: Some additional considerations. In R. C. Johnson, P. R. Dokecki, & O. H. Mowrer (Eds.), Conscience, contract, and social reality. New York: Holt, Rinehart & Winston, 1972.

Kanfer, F. H., & Phillips, J. S. Behavior therapy: A panacea for all ills or a passing fancy? Archives of General Psychiatry, 1966, 15, 114-128.

Kanfer, F. H., & Phillips, J. S. Learning foundations of behavior therapy. New York: Wiley, 1970.

Kanfer, F. H., & Phillips, J. S. Contract psychology: An operational approach to the problem of conscience and self-control. In R. C. Johnson, P. R. Dokecki, & O. H. Mowrer (Eds.), Conscience, contract, and social reality. New York: Holt, Rinehart, & Winston, 1971.

Kanfer, F. H., & Seidner, M. L. Self-control: Factors enhancing tolerance of noxious stimulation. Journal of Personality and Social Psychology, 1973, 25, 381-389.

Klein, R. D., Hapkiewicz, W. G., & Roden, A. H. (Eds.), Behavior modification in educational settings. Springfield, Ill.: Charles C. Thomas, 1973.

Kolb, D. A., Winter, S. K., & Berlew, D. E. Self-directed change: Two studies. Journal of Applied Behavioral Science, 1968, 4, 453-471.

Kozma, A., & Easterbrook, P. Effects of baseline self-reinforcement behavior and training level on post-training self-reinforcement behavior. Journal of Experimental Psychology, 1974, 102, 256-259.

Kurtz, P. D., & Neisworth, J. T. Self-control possibilities for exceptional children. Exceptional Children, 1976, 42, 212-217.

Layne, C. C., Rickard, H. C., Jones, M. T., & Lyman, R. D. Accuracy of self-monitoring on a variable ratio schedule of observer verification. Behavior Therapy, 1976, 7, 481-488.

Locke, E. A., Cartedge, N., & Koeppel, J. Motivational effects of knowledge of results: A goal-setting phenomenon? Psychological Bulletin, 1968, 70, 474-485.

Lopatto, D., & Williams, J. L. Self-control: A critical review and an alternative interpretation. Psychological Record, 1976, 26, 3-12.

Mahoney, M. J. Toward an experimental analysis of coverant control. Behavior Therapy, 1970, 1, 510-521.

Mahoney, M. J. Research issues in self-management. In M. J. Mahoney & C. E. Thoreson, Self-control: Power to the person. Monterey, Cal.: Brooks/Cole, 1974.

Mahoney, M. J., & Bandura, A. Self-reinforcement in pigeons. Learning and Motivation, 1972, 3, 293-303.

Mahoney, M. J., & Mahoney, K. Self-control techniques with the mentally retarded. Exceptional Children, 1976, 42, 338-339.

Mahoney, M. J., & Thoreson, C. E. Self-control: Power to the person. Monterey, Cal.: Brooks/Cole, 1974.

Marston, A. R. Variables affecting incidence of self-reinforcement. Psychological Reports, 1964, 14, 879-884.

Marston, A. R., & Feldman, S. E. Toward the use of self-control in behavior modification. Journal of Consulting and Clinical Psychology, 1972, 39, 429-433.

McCausland, D. F., & Stewart, N. E. Academic aptitude, study skills, and attitudes and college GPA. Journal of Educational Research, 1974, 67, 354-357.

McLaughlin, T. F. Self-control procedures in the management of classroom behavior problems. Education, 1976, 96, 379-383.

Miller, L. K. A note on the control of study behavior. Journal of Experimental Child Psychology, 1964, 1, 108-110.

Miller, A., & Gimpl, M. P. Operant verbal self-control of studying. Psychological Reports, 1972, 30, 495-498.

Nolan, J. D. Self-control procedures in the modification of smoking behavior. Journal of Consulting and Clinical Psychology, 1968, 32, 92-93.

O'Leary, K. D. The effects of self-instruction on immoral behavior. Journal of Experimental Child Psychology, 1968, 6, 297-301.

Pawlicki, R. E., & Morey, T. M. A low cost instrument for thinning self-directed schedules of reinforcement. Behavior Therapy, 1976, 7, 120-122.

Phillips, R. E., Johnson, G. D., & Geyer, A. Self-administered systematic desensitization. Behavior Research and Therapy, 1972, 10, 93-96.

Premack, D. Mechanism of self-control. In W. Hunt (Ed.), Learning and mechanisms of control in smoking. Chicago: Aldine, 1970.

Premack, D., & Anglin, B. On the possibilities of self-control in man and animals. Journal of Abnormal Psychology, 1973, 81, 137-151.

Richards, C. S., Perri, M. G., Gortney, C. Increasing the maintenance of self-control treatments through faded counselor contact and high information feedback. Journal of Counseling Psychology, 1976, 23, 405-406.

Roberts, A. H. Self-control procedures in modification of smoking behavior: Replication. Psychological Reports, 1969, 24, 675-676.

Rodin, M. A further look at social desirability. Psychonomic Science, 1972, 29, 103-105.

Rubin, R. D., Merbaum, M., & Fried, R. Self-imposed punishment versus desensitization. In R. D. Rubin, H. Fensterheim, A. A. Lazarus, & C. M. Franks (Eds.), Advances in behavior therapy. (Vol. 3). New York: Academic Press, 1971.

Schwartz, G. E. Biofeedback, self-regulation and the patterning of physiological processes. American Scientist, 1975, 63, 314-324.

Seidner, M. L. Behavior change contract: Prior information about study habits, treatment and statements of intention as related to initial effort in treatment. Dissertation Abstracts International, 1974, 34, 3509b.

Seligman, M. E. Learned helplessness. Annual Review of Medicine, 1972, 23, 407-412.

Shapiro, D., Barber, T. X., DiCara, L. V., Kamiya, J., Miller, N. E., & Stoyva, J. (Eds.), Biofeedback and self-control. Chicago: Aldine-Atherton, 1973.

Sirota, A. D., & Mahoney, M. J. Relaxing on cue: The self-regulation of asthma. Journal of Behavior Therapy and Experimental Psychiatry, 1974, 5, 65-66.

Staub, E., Tursky, B., & Schwartz, G. E. Self-control and predictability: Their effects on reactions to aversive stimulation. Journal of Personality and Social Psychology, 1971, 18, 157-162.

Stoyva, J., Barber, T. X., DiCara, L. V., Kamiya, J., Miller, N. E., & Shapiro, D. (Eds.), Biofeedback and self-control. Chicago: Aldine-Atherton, 1972.

Stuart, R. B. Trick or treatment: How and when psychotherapy fails. Champaign, Ill.: Research Press, 1970.

Theophanous, A. C. In defense of self-determination: A critique of B. F. Skinner. Behaviorism, 1975, 3, 97-115.

Thomas, D. R. Preliminary findings on self-monitoring for modifying teaching behaviors. In B. H. Hopkins (Ed.), A new direction for education: Behavior and analysis. (Vol. 1). University of Kansas, 1971.

Watson, D. L., & Tharp, R. G. Self-directed behavior: Self-modification for personal adjustment. Belmont, Cal.: Brooks/Cole, 1972.

Yates, A. J. Behavior therapy. New York: John Wiley & Sons, 1970.