

EFFECTS OF THE TYPE A BEHAVIOR PATTERN, DEPRESSION, AND THE
DURATION OF NONCONTROL ON THE ILLUSION OF CONTROL

by

K. Michael Dresel

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A thesis submitted to the Faculty of Graduate Studies of
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ABSTRACT

The Type A behavior pattern has been described as "an action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and if required to do so, against the opposing efforts of other things or other persons" (Friedman & Rosenman, 1974, p. 67). People displaying this pattern are competitive, aggressive, demanding, restless, impatient and time conscious (Sparacino, 1979). People are identified as Type As if they display a large number of these behaviors and as Type Bs if they display only a few of the behaviors (Jenkins, 1975). While the Type A behavior pattern has been linked to the incidence of coronary heart disease, the psychological concomitants of Type A behavior have received less attention. One major exception to this is the work of Glass (e.g. 1977) and his colleagues. Glass (1977) presented a great deal of evidence that suggested, albeit indirectly, that "Type A individuals exert greater efforts than Type B individuals to master stressful events which they perceive as a threat to their sense of control" (p. 7), and Glass and Carver (1980b) stated that "the Type A is engaged in a continual struggle to maintain control" (p. 68). The research relevant to this statement was reviewed, and an experiment was conducted to

provide a direct test of the hypothesis that the Type A is engaged in a struggle to control the environment.

The experiment used the Light Onset Control task (Alloy & Abramson, 1979) in which subjects assessed how much control they had over the onset of a light by pressing or not pressing a button. Light onset was in fact noncontingently related to responding and the dependant variable of interest was the amount of control that the subjects believed they had. This was assessed using the Light Onset Control scale (Alloy & Abramson, 1979).

The experiment used 185 introductory psychology students as subjects. Their Type A/B scores and current mood was assessed using the Jenkins Activity Survey (Form T) and the Beck Depression Inventory. As well, the State Anger and Multiple Affect Adjective Checklist were given. Then the Judgement of Control task was given, and the subjects received 16, 32 or 48 trials of trying to control the onset of a light. Light onset was actually controlled by a 50% random schedule and behavioral control therefore did not exist. Subjects then filled out the Judgement of Control scale (Alloy & Abramson, 1979) and the State Anger and MAACL scales were readministered.

Hypotheses

The following major hypotheses were tested in this study.

1. The Type A/B variable and task duration would interact to affect the judgement of control. These hypotheses follow from Glass (1977).
 - a) In the short task conditions (16 trials and to a lesser extent 32 trials) Type As would show larger illusions of control than Bs.
 - b) In the long task condition (48 trials) Type As would show smaller illusions of control than Bs.
 - c) The As in the short task condition would show larger illusions of control than As in the long task condition.
2. There would be a negative correlation between the magnitude of the illusion of control and mood change. That is, negative (dysphoric) mood changes would be associated with larger illusions of control. This hypothesis is inconsistent with the learned helplessness model of depression but was suggested by the Alloy and Abramson (1979) data.
3. The effects of depression and sex effects on the illusion of control observed by Alloy and Abramson (1979) would be replicated. Specifically, females would be somewhat more susceptible to the illusion of control than males, and nondepressed subjects would be much more susceptible than the depressed subjects.

4. The depression effects on the illusion of control observed by Alloy and Abramson (1979) would be modified by the duration of the uncontrollable situation.

The experimental results indicated that Type As were more accurate in perceiving act-outcome contingencies than Type Bs, but this effect did not vary with Trials duration. No relationship was observed between illusion of control and mood changes, and the Sex and Depression effects observed by Alloy and Abramson (1979) were only partially replicated. However, the effect of Depression on the illusion of control was found to be modified by the duration of the uncontrollable task. The implications of the results for Type A and Depression theories were discussed in relation to Glass's (1977, Glass and Carver, 1980a,b) theory, Alloy and Abramson (1979) and the Weisz and Stipek (1982) distinction between perceived contingency and perceived competence.

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CONTENTS

ABSTRACT	ii
Hypotheses	iv
ACKNOWLEDGEMENTS	vi

page

EFFECTS OF THE TYPE A BEHAVIOR PATTERN, DEPRESSION, AND THE DURATION OF NONCONTROL ON THE ILLUSION OF CONTROL	1
Type A behavior pattern	2
History of the Type A behavior pattern	2
Type A/B Assessment	4
Psychological Research on Type A/B	6
Judgement of Control	12
Hypotheses	20
Method	21
Subjects	21
Apparatus	22
Procedure	22
Phase 1 Pretask measures	22
Phase 2: Light Onset Control	23
Phase 3 Posttask measures	24
Variable and Group Construction	24
Results	27
Mood Changes	28
Type A Effects	34
Sex, Depression and Trial Effects	35
Summary	37
Discussion	39
Accuracy of control judgements	39
MAACL factor structure	40
State Anger Scale	41
Mood Changes and the Illusion of Control	42
Type A and the Illusion of Control	43
Depression and the Illusion of Control	45
Suggestions for future research	49
Summary	50
REFERENCES	52

Appendix

page

A. SCALES USED	59
B. INSTRUCTIONS TO SUBJECTS	68

LIST OF TABLES

<u>Table</u>	<u>page</u>
1. Principle Components Analysis	29
2. Sex x Trials MANOVA on Mood	33
3. Trials x Sex x Type A/B Means	35

LIST OF FIGURES

<u>Figure</u>	<u>page</u>
1. Sex x Trials Interaction on Mood	32
2. Trials x Depression Interaction on JOC and CPJ	38

EFFECTS OF THE TYPE A BEHAVIOR PATTERN,
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The Type A behavior pattern has been described as "an action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and, if required to do so, against the opposing efforts of other things or persons" (Friedman & Rosenman, 1974, p. 67). People displaying this pattern are competitive, aggressive, demanding, restless, impatient and time-conscious (Sparacino, 1979). People are identified as Type As if they display a large number of these behaviors and as Type Bs if they display only a few of the behaviors (Jenkins, 1975). While the Type A behavior pattern has been linked to the incidence of coronary heart disease, the psychological concomitants of Type A behavior have received less attention. One major exception to this is the work of Glass (1977) and his colleagues. Glass (1977) presented a great deal of evidence that suggested that the "Type A individuals exert greater efforts than Type B individuals to master stressful events which they perceive as a threat to their sense of control" (p. 7), and Glass and Carver (1980b) stated that "the Type A is engaged in a continual struggle to maintain control" (p. 68). Glass did not, however, assess directly the subjects' sense of control.

Alloy and Abramson (1979), investigated the relationship between depression and the illusion of control (Langer, 1975), and presented a methodology for assessing directly subjects' beliefs about how much control they have in an ambiguous situation. It was the goal of the present study to use Alloy and Abramson's (1979) methodology to test theoretical predictions derived from Glass (1975; Glass & Carver, 1980a,b). A further goal of this study was to replicate and extend Alloy and Abramson's (1979) results. Before describing the present study, the relevant literature on the Type A behavior pattern and the illusion of control is reviewed, and the hypotheses tested are described.

Type A behavior pattern

History of the Type A behavior pattern

The Type A behavior pattern was initially used to label a common behavioral style that was associated with the occurrence of coronary heart disease (Friedman & Rosenman, 1974). Traditional risk factors such as smoking, hypertension or serum cholesterol levels were not adequate to predict many cases of coronary heart disease (Jenkins, 1971, 1976) so Friedman and Rosenman examined the behaviors exhibited by coronary heart disease patients. On the basis of their examination they defined the Type A (coronary prone) behavior pattern as "an action-emotion complex that can be observed in any person who is aggressively involved in a chronic,

incessant struggle to achieve more and more in less and less time, and if required to do so, against the opposing efforts of other things or other persons" (p. 67). People displaying this pattern are competitive, aggressive, demanding, restless, impatient and time conscious (Sparacino, 1979). People are identified as Type As if they display a large number of these behaviors and as Type Bs if they display only a few of the behaviors (Jenkins, 1975).

In both prospective and retrospective studies the Type A/B variable has been shown to predict the incidence of coronary heart disease, being more important than other risk factors. This predictive relationship held for either of the two major methods of Type A/B assessment, the structured interview (Rosenman, Friedman, Straus, Wurm, Kositchek, Hahn & Werthessan, 1964) and the Jenkins Activity Survey (JAS, Jenkins, Rosenman & Friedman, 1967; Jenkins, Zyzanski & Rosenman, 1971; Zyzanski & Jenkins, 1970). These assessment methods are described in the next section. While originally designed to predict the incidence of coronary heart disease, the Type A/B variable has also been of interest to behavioral scientists in its own right. It is the psychological dimensions of the Type A/B behavior pattern, rather than the relation to coronary heart disease which was the focus of the present research.

Type A/B Assessment

There are two major methods for the assessment of Type A/B. The first one developed was the structured interview (Rosenman et al, 1964). In this interview the subject is asked 25 questions about competitiveness, time urgency and hostility. The questions are deliberately phrased to create a stressful atmosphere, with, for example, long pauses in the middle of some questions, to elicit stress reactions from susceptible individuals. Both the content and the style of answers contribute to the assessment of the individual as displaying the Type A or Type B behavior pattern. As well, this technique defines three intermediate categories: Incompletely developed As and Bs, and Mixed A and B. The structured interview is a relatively reliable test, with inter-rater agreements in the 75% to 85% range (Jenkins, Rosenman & Freidman, 1968, Caffrey, 1968, Keith, Lown & Store, 1965; Freidman, Hellerstein, Eastwood & Jones, 1968). Reports on test-retest reliability for the structured interview indicated that 80% of subjects received the same classification based on interviews 12 to 20 months apart (Jenkins et al, 1968).

The second major method for assessing the Type A/B behavior pattern is the Jenkins Activity Survey (JAS, Jenkins et al, 1967; Jenkins et al, 1971; Zyzanski & Jenkins, 1970). The JAS consists of 54 items that are similar in content to those used in the structured interview. The original scale

(Form B) yields 3 additional scales, beyond the overall Type A/B. These scales are labelled S (Speed and Impatience), H (Hard-driving) and J (Job Involvement, Zyzanski & Jenkins, 1970). These additional factors result from factor analysis, and are not good predictors of later coronary heart disease (Jenkins, Rosenman & Zyzanski, 1974). All four scales are scored by applying an optimal weighting scheme to the responses.

Form T, which deletes the Job Involvement questions, is designed for use with college students, and uses unit weights rather than the discriminant weights used to score Form B (Krantz, Glass & Snyder, 1974). Form T contains all 21 items of Form B that weight heavily for the overall A/B scale, and furthermore uses a unit weighting format, which yields better replicability than a factor analysis weighting format (Wainer, 1976; 1978).

The test-retest reliability of the JAS over a 1 year period was .66 (Jenkins et al, 1971). The student version of the JAS (Form T) seems to be reliable, even though little has been done to assess this. Glass (1977) reported that, over a 2 to 16 week duration, only 9 of 83 cases changed classification from A to B or from B to A.

The JAS and the structured interview do not seem to measure the same things. They agree on classification at rates of only 60% to 70% (Jenkins, 1978; Matthews, Krantz, Dembro-

ski & McDougall, 1982). This lack of agreement is probably because the structured interview assesses speech style, and the JAS can only assess content (Matthews, 1982).

There are other methods for assessing the Type A/B variable. The Framingham Type A scale (Haynes, Feinleib & Kannel, 1980) has been related prospectively to coronary heart disease incidence. Other scales which have not yet been shown to predict coronary heart disease include the Sales (1969) Type A measure and the Bortner Rating Scale (Bortner, 1969).

Psychological Research on Type A/B

This section focuses on the relationship between the Type A/B variable and drive to control the environment. For a more general treatment, Matthews (1982) provides an excellent overall review of the research on the psychological dimensions of the Type A/B variable.

Glass (1977; Glass & Carver, 1980a,b) stated that Type A individuals are highly motivated to perceive that they control their environment. This statement is based on research that related the Type A/B variable to the Learned Helplessness effect (see Seligman, 1975 for a review of Learned Helplessness theory and research). The term "learned helplessness" is used to describe a situation where experience with noncontrol results in later deficits in problem-solving

behavior. For example, a loud noise might be delivered to the subjects, who are led to believe that some response would cause the noise to terminate. This belief is veridical for some subjects (the Escapable or Controllable condition) but not for others (Inescapable or Uncontrollable condition). Following pretreatment, the test phase occurs, using a different task, and all subjects can escape the stressful stimulation. The subjects in the Inescapable condition typically show deficits in the test phase, relative to the subjects in the Escapable condition.

Glass (1977) reported a series of experiments that investigated the interaction between Control/Noncontrol and Type A/B. In one experiment, Glass (1977) reported that Type As respond faster in a reaction time test following 12 trials of inescapable noise than following 12 escapable noise trials, while Type Bs show the reverse effect. Glass interpreted these results as indicating that, while Bs show decreased motivation to respond following brief inescapable noise, Type As are threatened by lack of control and are more vigorous in their responses in an attempt to reassert environmental control. In another experiment (Krantz et al, 1974, Experiment 1), 35 noise trials, either escapable or inescapable, were followed by 18 escapable and avoidable noise trials with a different manipulandum. An additional variable, the intensity of the noise, was also manipulated. This experiment showed that under high stress levels, Type

As show the learned helplessness escape deficit, while Bs do not, and, under moderate stress levels, Type Bs show learned helplessness and As do not. Glass (1977) suggested that As distort uncontrollability cues that are low in salience but do not distort cues that are very salient. This experiment was replicated using cognitive tasks in place of escape/avoidance tasks, with essentially the same results (Glass, 1977). Type As only showed deficits in the high salience condition.

In sum then, Glass (1977) suggested that short duration uncontrollable stress (e.g. 12 noise trials) causes Type As to be hyper-responsive, while long duration, salient uncontrollable stress causes Type As to be less responsive. Glass & Carver (1980a,b) suggested further that this is due to Type As being highly motivated to control the environment, and therefore tending initially to distort or deny cues that signal the absence of control. Therefore As would be predicted to show little effect in a learned helplessness paradigm. However, following extended pretreatment with salient uncontrollable stress the Type As would be predicted to perceive accurately the amount of control they have, and to stop responding, demonstrating learned helplessness.

If Type As react to threats to their control by working harder, then Type As should show better performance on tasks when challenged by many interruptions than Type Bs. This hypothesis was tested by Fazio, Cooper, Dayson and Johnson

(1981) who gave Type A and Type B subjects a proofreading task under single or multiple activity conditions. In the single activity condition, subjects were only required to proofread a manuscript. In the multiple activity condition, subjects proofread the manuscript, tabulated the number of occurrences of the word "object", and, at irregular intervals, were asked to stop proofreading and solve anagrams. The dependant variable of interest was the accuracy of proofreading, that is, the number of errors found. Type As and Bs, as predicted, responded in opposite fashion to the activity manipulation, with Bs performing best in the single activity condition, and As performing best in the multiple activity condition. Fazio et al (1981) interpreted these results to suggest that Type As responded to multiple demands with an increased expenditure of effort so as to maintain their performance and therefore their sense of control, while Type Bs did not attempt to reassert control by working harder.

Matthews (1979) assessed differences between As and Bs in attempts to control in both adults and children. Two operant schedules (FR7 and VR7) were used, with nickels used as reinforcers for button pressing. The salience of the reinforcement was also manipulated. The latency to gain 31 nickels was measured, because Matthews assumed that shorter latencies indicated increased attempts to control the delivery of reinforcers. In the FR condition no differences were

found between As and Bs. In the VR condition, As and Bs reacted oppositely, with As responding faster in the high salience condition and slower in the low salience condition, while Bs responded faster in the low salience condition than in the high salience condition. The age of the subjects did not interact with any other variable. Matthews (1979) concluded that young and old Type As respond to loss of control by increasing efforts to reassert control. However, Matthews (1979) assumed that FR7 and VR7 schedules differ in the degree of control. Whether they did differ in degree of control is, in fact, a matter of definition. The primary difference between FR7 and VR7 schedules is one of predictability rather than actual controllability. It may be that predictability leads to the perception of control, or it may be that the predictability of the outcome was the critical variable. The Matthews (1979) experiment did not distinguish between these two possibilities.

Lovallo and Pishkin (1980) administered uncontrollable noise to Type A and Type B males during either a difficult or an easy cognitive task. They reported a Learned Helplessness type interference effect only with the Type Bs that experienced the difficult task. However, the aversive noise in this experiment was not contingent on the subjects' task performance, in contrast to the studies reported by Glass (1977) where an escape paradigm was used. Furthermore, subjects were told that the noise was uncontrollable. There-

fore, rather than failing to support Glass (1977), these results only strengthen the argument (Fazio et al, 1981) that the performance of Type As is less disrupted by extraneous, irrelevant distractors.

In one attempt to assess more directly the subjects' perceptions of control, Brunson & Matthews (1981) examined the verbalizations of Type A and Type B subjects during exposure to unsolvable discrimination problems. For one half of the subjects the salience of the failure to solve the problems was increased by having them record the "correct" and "incorrect" answers. Type As in the high salience condition used more ineffective strategies than Type As in the moderate salience condition, or Type Bs in either condition. Furthermore, high salience Type As and moderate salience Type Bs showed a decrease in the effectiveness of the problem-solving strategies they used as they experienced more failure problems. Brunson and Matthews (1981) concluded that this experiment demonstrated that Type As and Type Bs cope differently with uncontrollable events.

As with most of the research reviewed in this section, the Brunson and Matthews (1981) results indirectly supported Glass' (1977) hypothesis that Type As are sensitive to threats to their perceived control of the environment. The learned helplessness paradigm is at best an indirect assessment of the amount of control the subjects believe they have. The judgement of control experiments, described in

the next section, present a more direct method of assessing perceived control.

Judgement of Control

Control of an outcome is usually¹ defined as the difference between the probability of the outcome given the occurrence of a particular response and the probability of the outcome given the absence of the particular response (e.g. Jenkins & Ward, 1965; Seligman, 1975). Therefore, the degree of control can range from 1 through 0 to -1. The best examples of the different degrees of control come from the animal learning tradition, with a continuous reinforcement schedule (CRF) having a 1.0 degree of control, classical conditioning paradigms having 0 control and a differential reinforcement of other behavior schedule (DRO) exemplifying a situation with -1.0 control. However, in the usual usage, which is followed here, the dimension of control is bounded by 0 and 1, with, for example CRF and DRO schedules being termed controllable situations, and classical aversive or appetitive schedules being termed uncontrollable situations.

¹ Glass (1977; Glass & Carver, 1980a,b; Glass & Singer, 1972) defined control as the perceived contingency between acts and outcomes. This usage is not maintained in this discussion due to the potential for confusion that results from failing to discriminate between the actual experimental situation (e.g. a button press results in noise off-set) and the subject's perception of the situation (e.g. the subject believes no response would turn off the noise). If both of these examples are true in the same experiment, then it is ambiguous to say that the situation is controllable or not controllable, if the Glass definition is accepted.

Often fractional amounts of control are transformed to percentages, and this usage is maintained in the following discussion.

The accuracy of subjects' perceptions of control is of theoretical interest to many areas of research, especially the learned helplessness area. This has resulted in a number of studies that attempted to assess the accuracy of judgments of control.

Inhelder & Piaget (1958) investigated children's concepts of correlation. They reported that young children (approximately 10 years old) tended to identify correctly confirming and disconfirming cases². Older children correctly combined the two types of confirming cases (e.g. blue eyes/blond hair and brown eyes/brown hair) and the two types of disconfirming cases (e.g. blue eyes/brown hair and brown eyes/blond hair), and by 14 or 15 years most children correctly based their judgement of correlation on the difference between the proportion of confirming cases and the proportion of disconfirming cases. However, it is not clear whether Inhelder and Piaget's subjects were using proportions or frequencies, because balanced designs were used in all cases (e.g. 50% blue eyes and 50% brown eyes). Therefore, as Jenkins and Ward (1965) pointed out, frequency counts alone could have led to spurious "correct reasoning".

² Subjects were shown a set of pictures of faces with blue or brown eyes and blond or brown hair, and were asked about the relationship between hair and eye colour.

Jenkins & Ward (1965), in research not related to Learned Helplessness, examined contingency tracking ability. Their results suggested that people are not accurate in assessing contingency, but rather tend to use the number of success trials as an index of amount of control.

Langer (1975) used tasks such as lotteries and demonstrated an illusion of control. She defined illusion of control as "an expectancy of a personal success probability inappropriately higher than the objective probability would warrant" (p. 311). In six experiments, Langer showed that the introduction of skill factors such as choice, competition, familiarity or involvement into a chance task caused subjects to have more confidence in their chance to win. For example, in Experiment 2, subjects were either allowed to choose their own ticket on a small (\$50) lottery or were given a ticket by the experimenter. When asked just before the lottery draw what value they placed on their ticket, the subjects in the choice condition wanted an average of \$8.67, while the no-choice subjects only wanted an average of \$1.96. Clearly, choosing a lottery ticket altered the pay-back odds, at least subjectively.

Other, similar experiments demonstrated that competition, involvement in the lottery and familiarity with the lottery elements all affected the value subjects placed on their tickets. The effect of these variables was to make the tickets more valuable if the subject performed tasks that are typically perceived as controlling.

Langer & Roth (1975) used a coin-toss, the classical random binary number generator, and showed that prediction of a coin-toss was not always perceived as a random event. They showed that early successes in predicting the outcome of a coin-toss led subjects to believe that they could predict outcomes at better than chance rates, even though they had only experienced 50% accuracy of prediction.

Alloy & Abramson (1979) assessed subjects' judgements of contingency between responses and outcomes. In their first experiment, subjects attempted to control the onset of a light by either pressing or not pressing a button. Following 40 trials on this task, the subjects were asked to judge how much control they had over the light onset. Subjects actually had 25, 50, or 75% control, and their judgements of control were relatively accurate, although the subjects in the 25% control condition were least accurate, and erred by overestimating the degree of control. From these results, Alloy & Abramson (1979) concluded that subjects could estimate accurately the amount of control they had, in contrast to Jenkins & Ward's (1965) conclusion.

In Experiment 2, Alloy & Abramson (1979) administered one of two uncontrollable schedules to the subjects. One schedule had a high rate of light onset and the other had a low rate, but in neither schedule could the subjects control light onset. The high rate schedule resulted in a larger

illusion of control, particularly for non-depressed³ subjects, with an especially strong effect on non-depressed females. This finding of differential illusion of control between depressed and non-depressed subjects was further examined in Experiments 3 and 4.

In Experiment 3, Alloy & Abramson (1979) administered an uncontrollable schedule to depressed and non-depressed subjects and told them either that they were winning money with each light onset, or that they were losing money each time the light did not illuminate. No differences were found in judgement of control in the money-losing condition, but in the money-winning condition, non-depressed subjects reported having more control than depressed subjects. In Experiment 4, subjects were given a 50% control schedule under either the money-winning or the money-losing condition. In this situation, non-depressed subjects did not differ from depressed subjects in the money-winning condition, but in the losing condition, non-depressed subjects thought they had less control than they actually did have, whereas the depressed subjects accurately judged the degree of control.

³ Depression in these studies was defined by the subjects' scores on the Beck Depression Inventory (BDI, Beck, Ward, Mendelson, Mock & Erbaug, 1961; Beck, 1967) in Experiments 1 and 2 or both the Beck Depression Inventory and the Multiple Affect Adjective Check List (MAACL, Zuckerman & Lubin, 1965) in Experiments 3 and 4. Scores on the Beck Depression Inventory of more than 9 indicated depression, as did scores of more than 14 on the Multiple Affect Adjective Checklist.

Taken together, these studies suggested to Alloy & Abramson (1979) that, while people can judge the contingency between acts and outcomes, they often do not do so accurately. The errors were related to characteristics of the outcome and the subject's mood.

There is one very interesting side issue in the Alloy & Abramson (1979) report, concerning the affective changes that result from experiencing noncontrol. Alloy & Abramson (1979) measured affective state in a Pre-Post design using the Multiple Affect Adjective Checklist (MAACL, Zuckerman & Lubin, 1965) in Experiments 3 and 4, and report that "on all three of the affect measures, depressed students showed at least as great an enhancement of mood in the win condition as the non-depressed students, if not greater" (p. 468). While true, this statement is quite misleading, for their data (their Figure 8, p. 467) clearly show that, in the money-winning condition, depressed subjects show euphoric changes while non-depressed subjects show dysphoric changes. Similar results were found in Experiment 4. This differential response to noncontrol could be due to regression towards the mean, but if that were the case, one would expect the same results to have been found in the money-losing condition as well, and they were not.

It is interesting that the condition that produced the largest difference in control judgement also produced the greatest difference in mood changes. It is possible that

the nondepressed subjects were reacting affectively to a frustrating task but were not processing the information sufficiently to allow them to assess the degree of control accurately. Indeed, there could be a relationship, possibly causal, between the degree of affective response to uncontrollable tasks and accuracy of judgement of control.

In sum then, Jenkins & Ward (1965), Langer (1975) and Langer & Roth (1975) suggested that humans are not really accurate in their assessment of the controllability of a situation. Alloy & Abramson (1979) suggested that the errors of control assessment are primarily found in situations where there is no actual control. Furthermore, a number of variables are suggested to influence the magnitude of the illusion of control, including number of success trials (Jenkins & Ward, 1965), presence of skill elements (Langer, 1975), order of successes and failures (Langer & Roth, 1975), depression and, possibly, affective response (Alloy & Abramson, 1979).

Glass (1977; Glass & Carver, 1980a,b; Glass & Singer, 1972) stated that Type A individuals have a high drive to control the environment, and that Type As, when faced with an uncontrollable situation, initially distort their perceptions of the situation to heighten their sense of control. However, the evidence for these assertions was only indirect, relying on the transfer paradigm of Learned Helplessness experiments (Glass, 1977). These experiments demon-

strated performance deficits on the part of Type As that were compatible with the hypotheses, but they did not demonstrate altered perceptions of control on the part of Type A individuals. Given this ambiguity, alternate explanations are equally tenable. For example, the Type A subjects might not be altering their perceptions of control, but, as Frankel and Snyder (1978) suggest, might be protecting their self-esteem by working hard when exposed to short-duration uncontrollability.

Therefore, the present study tested directly whether or not Type As differ from Type Bs in perception of control, using the judgement of control task of Alloy and Abramson (1979). The subjects' judgements of control were assessed using the scale designed by Alloy and Abramson (1979) and presented in Appendix B. The duration of the uncontrollable task was varied, as Glass (1977) predicted that Type As would show greater illusions of control than Bs following short exposure to uncontrollability, and less illusion than Bs following extended exposure to uncontrollability. The effects of the uncontrollable task on the subjects' mood was also assessed, given Alloy and Abramson's (1979) observations. The subjects' current state of depression was assessed, for two reasons. First, Alloy and Abramson (1979) reported different magnitudes of illusion of control between depressed and nondepressed subjects, and this effect should be replicable. Second, it was possible that current depres-

sion state would interact with the Type A/B rating, given that both variables were individually predicted to affect the judgement of control. If Depression and Type A/B do interact, then it would also be predicted that the task duration would interact with the Depression and Type A/B variables.

Hypotheses

The following hypotheses were the major ones to be tested in this study.

1. The Type A/B variable and task duration would interact to affect the judgement of control. These hypotheses follow from Glass (1977).
 - a) In the short task conditions (i.e., 16 and 32 trials) Type As would show larger illusions of control than Bs.
 - b) In the long task condition (i.e., 48 trials) Type As would show less illusion of control than Bs.
 - c) The As in the short task condition would show larger illusions of control than As in the long task condition.
2. There would be a negative correlation between the magnitude of the illusion of control and mood change. That is, negative (dysphoric) mood changes would be associated with larger illusions of control. This hypothesis was suggested by the Alloy and Abramson (1979) data.

3. The Depression effects and Sex effects observed by Alloy and Abramson (1979) would be replicated. Specifically, females will be somewhat more susceptible to the illusion of control than males, and nondepressed subjects will be much more susceptible than the depressed subjects.
4. The Depression effects on the illusion of control observed by Alloy and Abramson (1979) would be modified by the duration of the uncontrollable situation.

The following experiment was conducted to test these hypotheses.

Method

Subjects

One hundred ninety-eight Introductory Psychology students were recruited for this experiment, 95 males and 103 females. Thirteen subjects were dropped due to failure to answer questions on the scales, failing to respond in the JOC task, always responding in the JOC task or for giving contradictory answers on the JOC scale, leaving a total sample size of 185, of which 89 were males and 96 were female. Subjects received course credit for participation in the experiment.

Apparatus

An Apple II+ computer and PDP8-A computer connected to an 8 room experimental suite were used to control the stimulus presentations and to monitor the subjects' responses. Eight small grey boxes (5 x 7 cm) were used to hold a green (cue) and a red (reinforcement) light emitting diode each. Eight 13" Sony TV monitors were used to display the feedback, and eight hand switches were used to collect the subjects' responses.

The scales used in this experiment were the Jenkins Activity Survey (Glass, 1977), the Multiple Affect Adjective Checklist (MAACL, Zuckerman & Lubin, 1965), the Beck Depression Inventory (BDI, Beck et al., 1961), the State Anger Scale (SAS, Spielberger, Jacobs, Russell, & Crane, 1982) and the Judgement of Control scale (JOC, Alloy & Abramson, 1979). These scales are presented in Appendix A.

Procedure

Phase 1 Pretask measures. Eight subjects were seated in separate rooms at a table in front of a TV monitor and the box with the red and green lights. Experimental credit cards were signed (1 credit) and subjects were then asked to fill out the JAS, BDI, MAACL, & State Anger scales. Subjects were assured of the confidentiality of their responses, and were not asked to give any identifying information

(i.e. name, student number). This part of the experiment lasted approximately 20 minutes.

Phase 2: Light Onset Control. The instructions for the task were read to the subjects through an intercom system (see Appendix B). Subjects received 16, 32 or 48 trials of the control task, in which they attempted to control the onset of the red "correct" light by either pressing or not pressing the handswitch. Each time the "correct" light was turned on incremented the subject's score by 5, with a score of 2.5 times the number of trials or more yielding an additional experimental credit. The salience of the score was enhanced by displaying "+5" on the TV monitor in front of each subject on each "correct" trial.

Each trial commenced with the green "cue" light being turned on for three seconds. During this time subjects had the option of pressing or not pressing the button on the handswitch. Following the three second cue period, the red "correct" light was turned on, according to a 50% schedule. Separate 50% schedules were used for button-press and non-press trials, to prevent serendipitous "control" that might otherwise have resulted from a particular sequence of presses and non-presses. All 8 subjects run at one time received the same task duration. All subjects in the experiment "earned" 1 additional experimental credit.

Phase 3 Posttask measures. Following the light onset control task subjects were asked to fill out the Judgement of Control scale, the MAACL, and the State Anger scale. These measures assessed the dependent variables of interest in this study. The Judgement of Control scale assessed the subjects' perceptions of the amount of control they had over red light onset, their perceptions of the number of reinforced trials, and the proportions of press and not press trials that resulted in reinforcement. The Phase 3 MAACL and SAS scales allowed assessment of mood changes that occurred during Phase 2. The additional experimental credit was given at the end of this phase and the subjects were completely debriefed.

Variable and Group Construction

Several variables were constructed from the raw data. Scale scores were calculated for the BDI and the Jenkins Activity Survey, as well as the pre and post test MAACL subscales (Hostility, Anxiety and Depression), and the State Anger scale. Two new variables were also constructed from the JOC scale. Question 3 and 4 of the JOC scale assess the subject's estimates of the conditional probabilities of receiving reinforcement following pressing (Question 3) or not pressing (Question 4) the button. Control is usually (e.g., Seligman, 1975) defined as the difference between these two probabilities and therefore a variable was constructed to

represent the subject's judgements of these probabilities. This variable was constructed as the absolute value of the difference between the estimates of the probabilities of reinforcement from questions 3 and 4 of the JOC scale. This variable was labelled Conditional Probability Judgement (CPJ) and represents a measure of how the subject perceives and reports the differential effects of responding and not responding.

The CPJ variable, while useful intuitively, was statistically unsuitable due to having an exponential distribution resulting from the absolute value term in its definition. Therefore, a second variable was constructed as the difference between the subject's global control judgments (JOC) and the judgement of conditional probabilities (CPJ). This new variable, labelled Judgement Discrepancy (JD), was much more suitable for statistical analysis. Conceptually, the JD variable represents how much the two assessments of control (JOC and CPJ) differ. Therefore, if two groups of subjects yielded equal JOC scores, but the JD variables are different, it can be concluded that one group yielded CPJ scores that were lower than those yielded by the other group. Group differences on either JOC or CPJ scores would be evidence for differential illusions of control.

Due to the additive relationship among the three judgement scores (i.e., $JOC = CPJ + JD$), an analysis of any two variables defines the analysis of the third. Therefore, analy-

sis of JOC and JD in a MANOVA yielded the same information as analyzing JOC and CPJ, while avoiding the CPJ variable with its unfortunate distribution.

Subjects were divided into nine groups on the basis of BDI and Jenkins Activity Survey scores. The distributions of each variable were divided into three ranges. The BDI distribution was divided into low nondepressed (Low-Non, scores 0-3.5), Medium Nondepressed (Med-Non, scores 3.5-8.5) and Depressed (Depr, scores 8.5+). The cutoff between 8 and 9 corresponds to the cutoffs used by Alloy and Abramson (1979, 1982) to divide subjects into depressed and nondepressed groups. The split between Low and Medium nondepressed groups results in groups of approximately equal size.

The subjects were also divided into three equal groups based on Jenkins Activity Survey scores, following the recommendations of Glass and Carver (1980a). The cutoff values used in this study were similar to those used by Brunson and Matthews (1981). Glass, Snyder and Hollis (1974) also used a three way split, but did not report scale scores. The groups formed for the present study were Type As (scores 8.5+, Medium As (scores 4.5-8.5) and Type Bs (scores 0-4.5).

Results

This experiment was conducted to test three main hypotheses. First, based on Glass (1977), it was hypothesized that Type As, relative to Bs, would show larger illusions of control following brief experience with uncontrollability and smaller illusions following extended experience with uncontrollability. Second, following Alloy and Abramson (1979), it was hypothesized that male subjects relative to female subjects and depressed subjects relative to nondepressed subjects would more accurately judge their degree of control. The effects of the Trials variable were also of interest here, because of possible interactive effects of Sex, Depression and amount of experience with uncontrollability. Finally, it was hypothesized that the magnitude of the illusion of control would be inversely related to the magnitude of mood change following experience with the uncontrollable situation.

The data were analyzed using MANOVA (with significant effects tested with univariate ANOVA and Tukey's HSD post hoc tests), for the Type A, Sex, Depression and Trials hypotheses. Since it was impossible to conduct the full Type A x Depression x Sex x Trials analysis due to missing cells (3 cells with no subjects and 5 with $n=1$), three separate MANOVAs were used to test these hypotheses. Therefore, the Type A x Depression, the Type A x Sex x Trials and the Depression x Sex x Trials analyses were conducted with JOC and JD as the dependent variables.

The mood change hypotheses were tested using repeated measures MANOVA, correlation and covariance analyses. The variables used for the analyses were JOC, JD, Sex, Trials, Type A, Depression and a set of factors resulting from a Principal Components Analysis (PCA).

Mood Changes. Before analyzing for effects on the mood variables (the MAACL subscales Anxiety, Hostility, and Depression and the State Anger Scale), a dimension reduction analysis was conducted. Principal Component Analyses (PCA) were conducted separately on the Pre-test and Post-test mood scores. The results of this analysis, presented in Table 1, suggested strongly that the three MAACL subscales measure virtually the same dimension. This was indicated by the high and equal loadings for the Anxiety, Hostility, and Depression scales on the first eigenvector (eigenvalues 2.60 pre-test and 2.79 post-test). The analysis also suggested that the Anger scale measured an independent dimension from that measured by the MAACL. The second dimension was only marginally significant statistically (eigenvalues .919 pre-test and .752 post-test), but the high, unique weighting for the Anger scale on the second eigenvector suggested strong independence of the Anger and MAACL scores.

Based on the results of the PCA, three new variables were constructed. Given the identical weights of the MAACL subscales, a unit weighting scheme (Wainer, 1976, 1978) was used to construct Mood Pretest and Mood Post-test scores by sum-

Table 1
Principle Components Analysis

A Pre-Test -- Hostility, Anxiety, Depression and Anger

	1	2	3	4
Eigenvalues	2.60	.919	.314	.164
Variance Proportion	.651	.230	.078	.041
Eigenvectors	1	2	3	4
Pre-test Hostility	.549	-.052	-.811	-.197
Pre-test Depression	.574	-.186	.215	.768
Pre-test Anxiety	.564	-.147	.539	-.608
Pre-test Anger	.226	.970	.079	.045

B Post-Test -- Hostility, Anxiety, Depression and Anger

	1	2	3	4
Eigenvalues	2.79	.752	.316	.144
Variance Proportion	.700	.188	.079	.036
Eigenvectors	1	2	3	4
Pre-test Hostility	.529	-.047	-.819	-.218
Pre-test Depression	.549	-.299	.169	.762
Pre-test Anxiety	.539	-.261	.524	-.606
Pre-test Anger	.359	.917	.162	.065

ming the Anxiety, Hostility and Depression subscale scores for Pre and Post-test. A change score (Mood Change) was also calculated as Mood Post-test minus Mood Pretest to assess direction and magnitude of mood changes. Similarly, a change score for the Anger variable (Anger Change) was also calculated.

Based on results reported by Alloy and Abramson (1979), it was hypothesized that subjects showing large dysphoric mood changes would also show large illusions of control. This hypothesis was not supported in two tests. First, correlation analysis showed no relationship between Mood Change and JOC ($r_{184} = -.02$, ns) or JD ($r_{184} = .03$, ns). Second, multiple regression analysis showed no relationship between either JOC or JD and Mood Post-test, if Mood Pre-test was controlled (JOC: $F_{1,181} = 1.36$, $p < .25$; JD: $F_{1,181} = .10$, ns). Similarly, no relationship was found between Anger Change and JOC ($r_{184} = .005$, ns) or JD ($r_{184} = .07$, ns), or between JOC and JD and Anger Post-test when Pretest Anger was controlled (JOC: $F_{1,181} = .22$, ns; JD: $F_{1,181} = .05$, ns).

In addition, a multivariate repeated measures ANOVA was performed, using Mood and Anger scores from pre and post-test as dependent variables, and Sex and Trials as independent variables. The MANOVA table is presented in Table 2. Neither Sex nor Trials accounted for a significant proportion of the variance (Sex: $F_{2,178} = 2.25$, $p < .109$; Trials: $F_{4,356} = .77$, ns) but the Sex x Trial interaction was margi-

nally significant ($F_{4,346} = 2.05, p < .087$). Examination of the univariate tests for this interaction revealed that this effect was due to the Mood scores ($F_{2,179} = 3.88, p < .023$) and not the Anger scores ($F_{2,179} = .73, ns$). Figure 1 presents the Sex x Trials interaction on the Mood score, where it can be seen that the males in the 32 and 48 trial conditions were slightly happier than the males in the 16 trial condition, while for females the pattern was reversed. However, none of the pairwise comparisons were significant by Tukey's HSD test.

The repeated measures MANOVA revealed a significant difference between pre and post test scores ($F_{2,178} = 19.06, p < .001$). The univariate tests revealed a reliable difference on the Mood scores ($F_{1,179} = 37.34, p < .001$) but no difference on Anger scores ($F_{1,179} = 1.02, p < .315$). The mean Mood-Pretest score was 30.80 while the mean post test score was 35.25, indicating a reliable tendency for all subjects to exhibit a negative mood shift following the JOC task. However, this pre-post effect did not interact even marginally with any of the between subjects variables.

To summarize the results of the analyses of the mood variables, four findings emerged. First, the PCA showed that the MAACL measured only one dimension of negative affect. Second, no relationship was found between changes in mood and illusion of control. Third, although all subjects became more dysphoric following the JOC task, no differen-

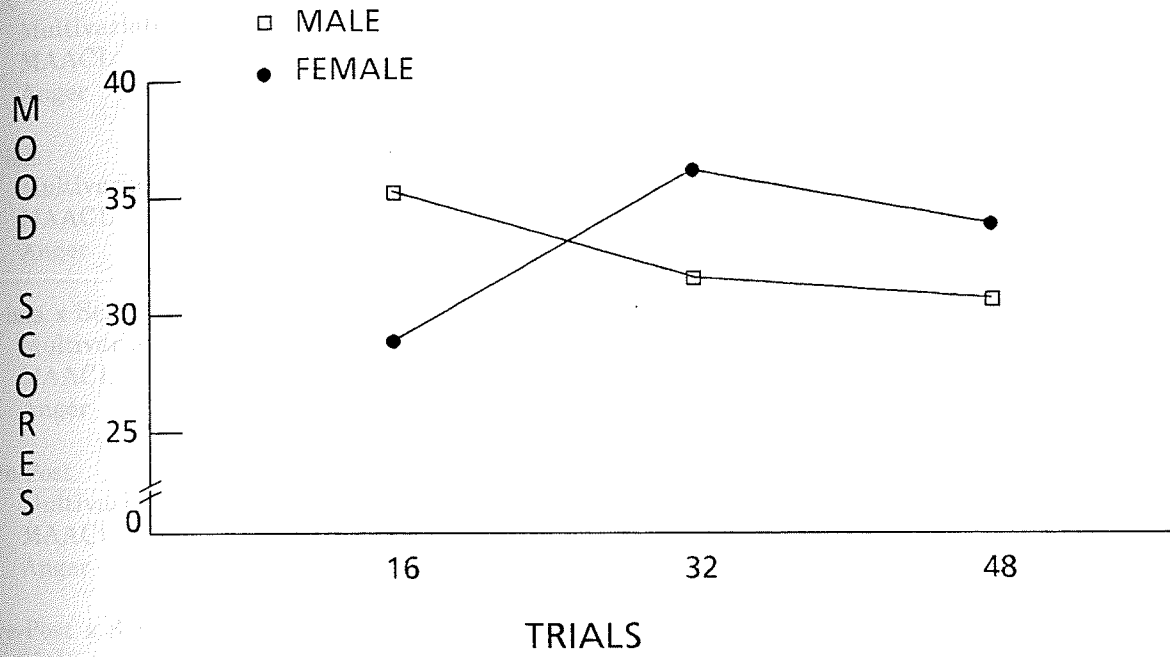


Figure 1

Sex by Trials Interaction on Mood Scores
Combined Pretest and Posttest

Table 2
Sex x Trials Repeated Measures MANOVA on
Mood Pre- and Post-Tests

<u>Effects</u>	<u>df</u>	<u>F</u>	<u>P</u>
Sex			
Multivariate	2,178	2.25	.1083
MAACL	1,179	.04	.8342
Anger	1,179	3.78	.0533
Trials			
Multivariate	4,356	.77	.5435
MAACL	2,179	.45	.6387
Anger	2,179	1.45	.2363
Trials x Sex			
Multivariate	4,356	2.05	.0864
MAACL	2,179	3.88	.0224
Anger	2,179	.73	.4837
Pre-Post			
Multivariate	2,178	19.06	.0001
MAACL	1,179	37.34	.0001
Anger	1,179	1.02	.3144
Pre-Post x Sex			
Multivariate	2,178	.78	.4597
MAACL	1,179	1.07	.3017
Anger	1,179	.11	.7370
Pre-Post x Trials			
Multivariate	4,356	.98	.4184
MAACL	2,179	1.25	.2893
Anger	2,179	.86	.4231
Pre-Post x Trials x Sex			
Multivariate	4,356	.35	.8420
MAACL	2,179	.02	.9173
Anger	2,179	.62	.5399

tial changes were found as a result of either Sex of subject or duration of experience with the JOC task. Finally, a marginal Sex x Trials interaction was observed, but this was probably due to sampling error, because no differential effect was found on pre and post test assessments. In other words, the observed Sex x Trials effect was found on pretest and post test equally, and therefore the effect could not be due to any experimental manipulation.

Type A Effects. The hypothesis that Type As and Type Bs would show different effects of the Trials variable was tested by examining the Trials x A/B interaction effect of the MANOVA. This effect was nonsignificant ($F_{8,332} = 1.38$). Therefore, the prediction from Glass (1977) was not supported. However, a significant Type A effect was observed ($F_{4,350} = 3.22, p < .013$). Univariate tests determined the difference to be primarily on the JD variable ($F_{2,176} = 4.80, p < .010$), with the group differences on JOC to be only marginal ($F_{2,176} = 2.98, p < .054$). Tukey's post hoc test showed that Bs scored lower on JD than did Medium and High As, with no reliable pairwise difference on JOC. Because low JD scores indicate JOC and CPJ scores that are very similar, this result suggests that the B's global judgements of control (JOC) are more closely tied to their perceptions of the conditional probabilities (CPJ) than those of the Medium and High As. Table 3 presents the means from this analysis.

Table 3
Means for Trials x Sex x Type A/B

Type A/B

	Low	Medium	High	\bar{X}
16 Trials				
Male				
JOC	18.50	54.19	24.78	38.74
JD	1.17	33.75	3.44	18.65
Female				
JOC	39.25	36.92	56.67	40.15
JD	3.58	11.33	17.67	8.59
32 Trials				
Male				
JOC	29.00	47.00	39.91	39.34
JD	5.63	33.90	29.73	24.52
Female				
JOC	36.50	41.85	27.10	35.80
JD	11.08	18.15	9.70	13.31
48 Trials				
Male				
JOC	39.00	36.40	38.07	37.66
JD	26.20	21.30	23.50	23.21
Female				
JOC	27.90	22.73	31.33	26.53
JD	8.30	3.87	25.89	11.00
\bar{X}	Low	Medium	High	Grand Mean
JOC	32.57	39.86	34.25	36.07
JD	8.34	20.03	19.11	16.40

Sex, Depression and Trial Effects. While Alloy & Abramson (1979) reported that males showed less of an illusion of control than females, the present data shows a somewhat different result. The reliable Sex effect ($F_{2,166} = 4.30, p < .016$) was due to a difference on JD ($F_{1,167} = 6.96, p < .010$) and not to differences on JOC ($F_{1,167} = .92, ns$). The males showed higher JD scores than the females (Means: Males = 22.04, Females = 11.17). Therefore, because no differences were found between males and females in global control judgements, females showed less accurate conditional probability judgements. The direction of the male-female difference in JD scores suggests that the females' global control judgements are more closely tied to their perceptions of act-outcome contingency than are males' judgements.

Depression did not relate significantly to the illusion of control ($F_{4,332} = .84, ns$), but the linear Trials x Depression interaction was reliable ($F_{4,332} = 3.37, p < .011$). Neither variable yielded a significant univariate effect. This interaction, graphed in Figure 2, indicates that the three Depression groups yielded different patterns of trials effects. Figure 2, which shows the JOC and CPJ variables, illustrates that the Depressed group shows a pattern of decreasing JOC and CPJ with increasing trials, while the Low-Nondepressed group shows JOC and CPJ scores that are not affected by increased trials. The Medium Nondepressed group shows stable JOC scores as in the Low Nondepressed pattern,

and decreasing CPJ scores with increasing trials as in the Depressed group pattern. This suggests that the two variables have different sensitivities to the effects of depressed mood.

A significant linear Trials effect was found ($F_{2,166} = 5.65, p < .005$) with subjects showing less illusion of control with increasing trials. Again, neither univariate effect was reliable. Figure 2 shows that the Trials main effect needs to be interpreted with caution given the significant Trials x Depression effect.

Summary. The analysis of the results yielded the following findings. First, the MAACL was shown to measure only one dimension of affect. Second, the subjects' mood shifted negatively during the JOC task. Third, no relationship was found between mood changes and the magnitude of the illusion of control. Fourth, while an overall Type A/B effect or illusion of control was found, the Type A/B by Trials interaction on the illusion of control, predicted from Glass (1977, Glass & Carver, 1980a,b), was not found in this study. Fifth, a Sex effect on illusion of control was found on the JD variable, and finally, a reliable Depression by Trial effect on illusion of control was observed.

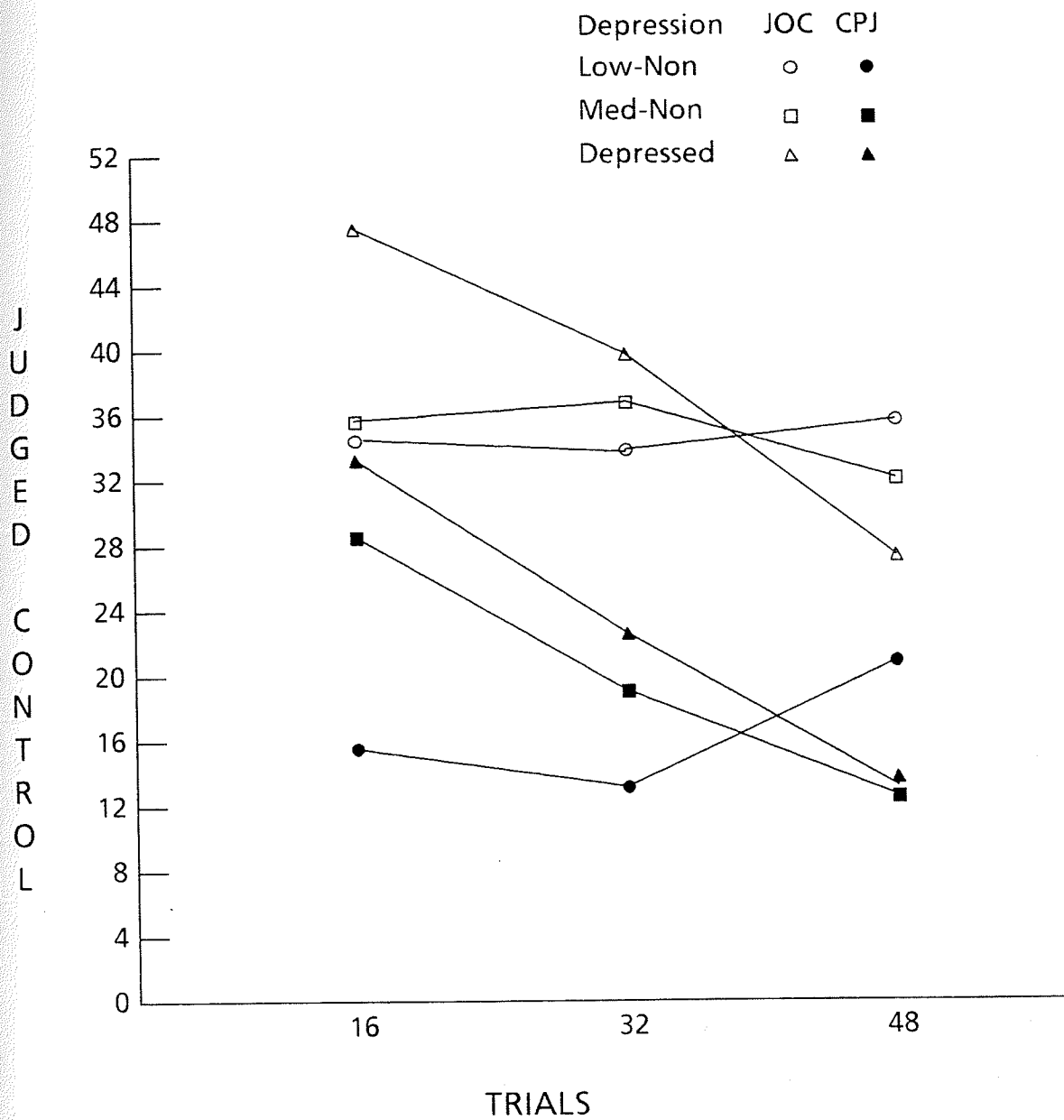


Figure 2

**Trials by Depression Interaction
JOC and CPJ**

Discussion

This experiment yielded several interesting findings. Following a short discussion of the concept of accuracy of control judgements, the minor findings, which were the factor structure of the MAACL and the relationship between the MAACL and the State Anger Scale, will be briefly discussed. Then the conclusions drawn from the tests of the major hypotheses will be discussed. Finally, a summary and integration will be presented.

Accuracy of control judgements

There have been several operational definitions of accurate judgements of control. Langer and Roth (1975) in their coin-toss prediction experiment defined predictions of near 50% as accurate, with higher predictions indicating illusions of control. Alloy and Abramson (1979) defined accurate judgements of control as answers to Question 1 of the JOC scale (See Appendix A, Form 5) that corresponded to objective difference between the probabilities of reinforcement given responding and not responding. The present experiment used two measures of control judgements, either of which could be accurate or inaccurate. The first measure used here (JOC) was the same as Alloy and Abramson's, and the second measure used (CPJ) was the control estimate that resulted from the subjects' assessment of the conditional probabilities that represented the act/outcome contingencies.

cies. High scores on either JOC or CPJ indicated inaccurate control judgements, because the objective amount of control was zero. Therefore, in this experiment, accurate judgements refer to control judgements that are close to the objective amount of control that the subject had.

MAACL factor structure

When both the pre and post test MAACL scores were subjected to Principal Components Analysis, only one factor emerged. Each MAACL subscale contributed equally to this factor, and the structure was consistent between pre and post test. One conclusion that can be drawn from this finding is that the MAACL does not contain three different subscales (Anxiety, Hostility, and Depression), as it was designed to do (Zuckerman & Lubin, 1965), but rather measures only one dimension. This is not to say that the MAACL is not a valid measure of negative affect, but rather that the Anxiety, Hostility and Depression subscales all measure the same dimension of affect.

This finding corresponds with the conclusions drawn by Howarth and Schokman-Gates (1981) and has two implications for research using the MAACL. First, researchers should be aware that, while anxiety, hostility and depression are conceptually different constructs, the MAACL does not seem to differentiate among them. Secondly, the researcher should be wary of interpreting differences on subscales, or of

group differences on one subscale but not on another. The results of this study argue strongly that the MAACL measures only one dimension, that of negative affect (Howarth and Schokman-Gates, 1981).

State Anger Scale

Spielberger et al's (1982) State Anger Scale was not correlated with the MAACL variables, did not change from pre to post test, and was not related to Type A/B, Sex, Depression or Trials. If the Anger scale is a valid measure of State Anger, as Spielberger et al. (1982) suggested, then it may be concluded that mere exposure to noncontingency is not a sufficient condition to induce 'state anger' in the subjects. This is consistent with the findings of Glass, Krakoff, Contrada Hilton, Kehoe, Manucci, Collins, Snow and Elting (1980). These investigators found that A/B differences in physiological reactivity were not evident under conditions of failure in a competition but were observed when uncontrollable failure was combined with harassment. This along with the present results suggests that noncontingency in isolation is unlikely to occasion A/B differences in anger (the results here) or physiological reactivity (Glass et al., 1980).

Mood Changes and the Illusion of Control

It was hypothesized that there would be a relationship between illusion of control measures and mood changes. This hypothesis was derived from the learned helplessness hypothesis. According to Alloy and Abramson (1979), "the learned helplessness model of depression states that when people acquire the expectation that important outcomes and responses are independent, they exhibit the major motivational, cognitive, and affective symptoms of depression" (p. 446). This would suggest that decreasing illusions of control would lead to dysphoric mood. Alloy & Abramson's (1979) data, however, suggested that the subjects who showed larger illusions of control also showed larger dysphoric mood changes, the opposite of the effect predicted by the learned helplessness model. Unfortunately, the only reliable changes in mood observed in the present study were as a result of experience with the uncontrollable situation, with no reliable effect of Trials, Depression, or magnitude of Illusion of Control. The results support neither the Learned Helplessness hypothesis nor the observation from Alloy and Abramson's (1979) study, because no relationship was found between mood change and judgements of control. However, these findings do suggest that the subjects found the experience with noncontrol aversive, as evidenced by dysphoric mood changes from pretest to post test.

The finding that the MAACL was affected by experiencing noncontrol, while the State Anger Scale was not, also suggests that the MAACL measures a dimension that is functionally distinct from anger. This is in accord with the results of the principal components analysis, where the MAACL scores and State Anger scores defined orthogonal dimensions.

Type A and the Illusion of Control

Medium and High Type As were found to show greater discrepancies between global control judgements (JOC) and contingency judgements (CPJ) than Type Bs. Because no differences were found on global control judgements between the Type A/B groups, this suggests that Medium and High As show more accurate assessment of actual contingencies between responses and outcomes than Bs. However, this more accurate assessment did not influence the A's global control judgements. Therefore, Type As seem to be much more sensitive to actual contingencies than Bs, which supports the suggestions of Glass (1977).

Glass (1977) also predicted that illusions of control would vary as a function both of Type A and amount of experience with uncontrollability. This prediction was not supported by the results of this study, which found that Type As did not react to increasing experience with uncontrollability by changing their judgements about the controllability of the situation. This implies that the A/B differ-

ences that Glass reports (1977; Glass & Carver, 1980a,b) may not be due as much to changes in judgements about the controllability of the situation, as to the different motivational consequences arising from similar judgements of contingencies.

For instance, it may be that Type As react to brief exposure to uncontrollability with increased motivation to perform, relative to Bs, while extended experience with noncontrol leads As to be less motivated to perform. This does not assume that the Type A fails to recognize uncontrollability after brief exposure, as Glass (1977) suggested, but rather that the Type A, recognizing an uncontrollable situation, responds with heightened vigor initially, out of a desire to regain control. It may also reflect a tendency on the part of Type As to attribute short-term uncontrollability to unstable factors. This explanation is compatible both with the present data and with Glass (1977; Glass and Carver, 1980a,b). It could be argued that the present experiment did not provide sufficiently salient cues as to the controllability of the situation to permit the predicted interaction between Type A/B and Trials to be observed. However, the observation of the predicted Type A sensitivity to contingency argues against that suggestion. If the cues to noncontrol were not salient, then no differences between Type As and Bs would have been observed.

Depression and the Illusion of Control

The Alloy and Abramson (1979) finding that depressed subjects showed less illusion of control was replicated in this experiment only in the 48 trial condition. Illusion of control was shown here to be a linear function of both level of Depression and amount of experience with the uncontrollable situation. This finding suggests strongly that depression does not necessarily predict more accurate judgements of control, but rather leads to faster learning about the lack of contingencies (see Figure 2). Indeed, the most depressed subjects in the 16 trial condition showed the largest illusions of control. It is possible that this combination of initial control illusion and rapid learning has implications for the durability of some depressions. For example, this finding suggests that even when depressed people enter a novel situation with initial high expectations of success they could quickly learn that they do not control the situation. Nondepressed individuals on the other hand are slower to alter their perceptions of control and therefore do not succumb as readily to beliefs in helplessness and to depression.

Further research is required to investigate the implications of the interaction between level of Depression and experience with noncontrol. However, these results represent a replication and extension of Alloy and Abramson's (1978) findings. While Alloy and Abramson (1979) reported that de-

pressives are less prone to illusions of control following 40 trials, the present data show that this effect is a function of experience with noncontrol. With 48 trials of experience the Alloy and Abramson data were replicated while with 16 trials the Depressed subjects were more prone to illusions of control than Low Non-Depressed subjects. Furthermore, the performance of the Medium Non-Depressed group suggests that level of depression affects the subject's sensitivity to actual contingency. The Medium Non-Depressed group shows performance midway between the Depressed and Low Non-Depressed groups on both global control judgements (JOC) and conditional probability judgements (CPJ). Also, patterns of response on the two judgement variables suggest a sensitivity to contingencies that increases as a result of increasing depression. It is important to point out that this experiment does not provide information on the direction of the relationship between depression and sensitivity to non-contingency. It may well be that the depression measured at pre-test was a result of a personal style that included initially high assessments of personal control and high sensitivity to disconfirming information. However, the reverse, that the depression results in that personal style, is equally compatible with the present results.

While additional research is needed to refine this analysis, these results argue strongly in favor of using a fine-grained multivariate analysis strategy. Clearly, dichotom-

izing subjects into High and Low Depression does not adequately capture all the variability, nor should only global judgements of control be assessed. If subjects had been dichotomized into High and Low Depression groups, then the patterns observed in Figure 2 would have been obscured. Furthermore, if only the JOC question had been analyzed, then the results would have been less interpretable.

Weisz and Stipek (1982) have provided an analysis of the control construct which suggests a way of thinking about the observed differences between global judgements of control and perceived contingencies. These authors distinguished between two dimensions of perceived control, perceived contingency and perceived competence of self, and suggested that these two dimensions may show different developmental patterns. It is possible that the global control judgement (the JOC variable) assessed in the present study actually measures something similar to the perceived competence dimension suggested by Weisz and Stipek (1982), while the CPJ variable measures perceived contingency. In this light, the Type As and Bs in the present study did not differ in their perceived competence, nor was that perceived competence differentially affected by amount of experience with noncontrol. However, the As and Bs did differ in their perceptions of contingencies (see Table 3). The fact that global judgements of control (JOC) did not follow perceived contingencies (CPJ) suggests that the judgement of control vari-

able actually measures something other than "control" as defined by Alloy and Abramson (1979). The Weisz and Stipek (1982) suggestion of two dimensions of perceived control fits well with the present data for both the observed Type A/B differences and the observed Trials by Depression effect. Type As were shown to be more accurate in perceived contingencies than Bs, which corresponds with Glass (1977). It was suggested that motivational or attributional differences account for the performance differences reported by Glass (1977; Glass & Carver, 1980a,b), rather than distortion or denial of perceived contingency, as Glass suggested.

The Weisz and Stipek (1982) suggestion deserves some discussion in the context of the effects of depression on the illusion of control. If the global control judgements measured here may actually represent something more like a measurement of perceived competence, then the present data, and Alloy and Abramson's (1979) data indicate that the depressives' self concept was quite sensitive to environmental contingencies, while this was not so for the nondepressed. Furthermore, the depressive subjects in this study showed perceptions of competence after 16 trials that were quite inflated relative to the nondepressed subjects. These results seem to be contrary to the learned helplessness model, which would suggest an insensitivity to contingencies and a low perception of competence on the part of the depressed subjects. However, it should be pointed out that the subjects in the present study were not clinically depressed.

Depressed subjects in the present experiment showed the greatest changes in perceived contingency as a function of number of trials, and also showed decreases in global control judgements, while the nondepressed subjects did not. This was suggested to have implications for the etiology or maintenance of depression, but this discussion is only speculative at this point, until additional research assesses the relationship between the JOC scale and the dimensions of perceived control and competence.

Suggestions for future research

The results of this experiment suggest several areas for future research. The Judgement of Control scale deserves further investigation to define what is actually measured by the individual questions. Particularly, it should be determined if the global control judgement (JOC) is, as suggested earlier, a measure of the Weisz and Stipek (1982) construct of perceived competence. Another area that needs to be addressed is the implications of the present finding that experience with noncontrol interacts with depression level to determine the illusion of control. This interaction was suggested to be a factor in the development and maintenance of depression, and that suggestion is open to empirical verification. Also, this interaction may have implications for the etiology of depression. In addition, the effects of increasing exposure to noncontrol on both perceived contingency and perceived competence should be investigated. The

causes to which subjects attribute their lack of control likely varies with increasing mood and with experience with noncontrol.

The failure to find the predicted Type A/B and experience with noncontrol interaction led to the suggestion that motivational changes account for the performance differences observed by Glass (1977), rather than the distortion or denial of control cues as he suggests. Experimental evaluation of these two competing hypotheses would be very useful for describing the psychological dimensions along which Type As and Bs differ. As well, the Weisz and Stipek (1982) distinction between perceived competence and perceived contingency should also be investigated in relation to differences between As and Bs.

Summary

In conclusion, several results of interest were found in this study, Type As were shown to be more accurate than Type Bs in judging contingencies between acts and outcomes, which supported the Glass (1977) predictions. However, Glass (1977; Glass & Carver, 1980a,b) also predicted that this effect would be a function of amount of experience with noncontrol, and this prediction was not supported. Type As and Bs showed the same relative differences regardless of amount of experience with noncontrol. This finding was interpreted to mean that Type As and Bs are not different in how they change judgements about contingency or control.

The results of Alloy and Abramson (1979) were replicated in this study and were extended to demonstrate that illusions of control depend on both level of depression and amount of experience with noncontrol. This was interpreted to mean that depressives learn more rapidly than nondepressives to identify non-contingency, and that this ability increases with increasing depression. This study demonstrated the utility of examining the Medium group, as well as High and Low Depression groups. Also, this study examined two measures of illusion of control, the global judgement of control (JOC) and the judgements of contingencies between acts and outcomes (CPJ). Both of these measures proved useful in describing the effects of the independent variables on illusions of control. These findings were discussed in relation to the Weisz and Stipek (1982) suggestion of two dimensions of perceived control, perceived competence and perceived contingency.

In addition to these major findings, it was also demonstrated that the subject's mood did not change as a function of the magnitude of the illusion of control. However, subjects tended to be more dysphoric following the experimental session. The analysis of the mood scales also demonstrated that the three MAACL scales actually measure only one dimension of negative affect.

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9. When you listen to someone talking, and this person takes too long to come to the point, do you feel like hurrying him along?
1. Frequently
 2. Occasionally
 3. Almost never
10. How often do you actually "put words in his mouth" in order to speed things up?
1. Frequently
 2. Occasionally
 3. Almost never
11. If you tell your spouse or a friend that you will meet them somewhere at a definite time, how often do you arrive late?
1. Once in a while
 2. Rarely
 3. I am never late
12. Do you find yourself hurrying to get places even when there is plenty of time?
1. Often
 2. Occasionally
 3. Rarely or never
13. Suppose you are to meet someone at a public place (street corner, building lobby, restaurant) and the other person is already ten minutes late. Will you
1. Sit and wait?
 2. Walk about while waiting?
 3. Usually carry some reading matter or writing paper so you can get something done while waiting?
14. When you have to "wait in line," such as in a restaurant, a store, or the post office, do you
1. Accept it calmly?
 2. Feel impatient but not show it?
 3. Feel so impatient that someone watching could tell you were restless?
 4. Refuse to wait in line, and find ways to avoid such delays?
15. When you play games with young children about ten years old, how often do you purposely let them win?
1. Most of the time
 2. Half of the time
 3. Only occasionally
 4. Never
16. Do most people consider you to be
1. Definitely hard-driving and competitive?
 2. Probably hard-driving and competitive?
 3. Probably more relaxed and easy going?
 4. Definitely more relaxed and easy going?
17. Nowadays, do you consider yourself to be
1. Definitely hard-driving and competitive?
 2. Probably hard-driving and competitive?
 3. Probably more relaxed and easy going?
 4. Definitely more relaxed and easy going?
18. How would your spouse (or closest friend) rate you?
1. Definitely hard-driving and competitive?
 2. Probably hard-driving and competitive?
 3. Probably more relaxed and easy going?
 4. Definitely more relaxed and easy going?
19. How would your spouse (or best friend) rate your general level of activity?
1. Too slow. Should be more active.
 2. About average. Is busy much of the time.
 3. Too active. Needs to slow down.
20. Would people who know you well agree that you take your work seriously?
1. Definitely Yes
 2. Probably Yes
 3. Probably No
 4. Definitely No

21. Would people who know you well agree that you have less energy than most people?
1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No
22. Would people who know you well agree that you tend to get irritated easily?
1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No
23. Would people who know you well agree that you tend to do most things in a hurry?
1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No
24. Would people who know you well agree that you enjoy "a contest" (competition) and try hard to win?
1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No
25. Would people who know you well agree that you get a lot of fun out of your life?
1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No
26. How was your "temper" when you were younger?
1. Fiery and hard to control 3. No problem
2. Strong, but controllable 4. I almost never got angry
27. How is your "temper" nowadays?
1. Fiery and hard to control 3. No problem
2. Strong, but controllable 4. I almost never got angry
28. When you are in the midst of studying and someone interrupts you, how do you usually feel inside?
1. I feel O.K. because I work better after an occasional break.
2. I feel only mildly annoyed.
3. I feel really irritated because most such interruptions are unnecessary.
29. How often are there deadlines in your courses? (If deadlines occur irregularly, please circle the closest answer below.)
1. Daily or more often 2. Weekly 3. Monthly 4. Never
30. Do these deadlines usually
1. Carry minor pressure because of their routine nature?
2. Carry considerable pressure, since delay would upset things a great deal?
31. Do you ever set deadlines or quotas for yourself in courses or other things?
1. No 3. Yes, once per week or more often.
2. Yes, but only occasionally
32. When you have to work against a deadline, is the quality of your work
1. Better? 2. Worse? 3. The same? (Pressure makes no difference)
33. In school do you ever keep two projects moving forward at the same time by shifting back and forth rapidly from one to the other?
1. No, never. 2. Yes, but only in emergencies. 3. Yes, regularly.
34. Do you maintain a regular study schedule during vacations such as Thanksgiving, Christmas, or Easter?
1. Yes 2. No 3. Sometimes

35. How often do you bring your work home with you at night or study materials related to your courses?
1. Rarely or never.
 2. Once a week or less often.
 3. More than once a week
36. How often do you go to the school when it is officially closed (such as nights or weekends)? If this is not possible, put "0."
1. Rarely or never.
 2. Once a week or less often.
 3. More than once a week
37. When you find yourself getting tired while studying, do you usually
1. Slow down for a while until your strength comes back.
 2. Keep pushing yourself at the same pace in spite of the tiredness.
38. When you are in a group, do the other people tend to look to you to provide leadership?
1. Rarely.
 2. About as often as they look to others.
 3. More often than they look to others.
39. Do you make yourself written lists of "things to do" to help you remember what needs to be done?
1. Never
 2. Occasionally
 3. Frequently

IN EACH OF THE FOLLOWING QUESTIONS, PLEASE COMPARE YOURSELF WITH THE AVERAGE STUDENT AT YOUR SCHOOL. PLEASE CIRCLE THE MOST ACCURATE DESCRIPTION.

40. In amount of time and effort, I give
- | | | | |
|---------------------|-------------------------|-------------------------|---------------------|
| 1. Much more effort | 2. A little more effort | 3. A little less effort | 4. Much less effort |
|---------------------|-------------------------|-------------------------|---------------------|
41. In sense of responsibility, I am
- | | | | |
|--------------------------|------------------------------|------------------------------|--------------------------|
| 1. Much more responsible | 2. A little more responsible | 3. A little less responsible | 4. Much less responsible |
|--------------------------|------------------------------|------------------------------|--------------------------|
42. I find it necessary to hurry
- | | | | |
|--------------------------|------------------------------|------------------------------|--------------------------|
| 1. Much more of the time | 2. A little more of the time | 3. A little less of the time | 4. Much less of the time |
|--------------------------|------------------------------|------------------------------|--------------------------|
43. In being precise (careful about detail), I am
- | | | | |
|----------------------|--------------------------|--------------------------|----------------------|
| 1. Much more precise | 2. A little more precise | 3. A little less precise | 4. Much less precise |
|----------------------|--------------------------|--------------------------|----------------------|
44. I approach life in general
- | | | | |
|------------------------|----------------------------|----------------------------|------------------------|
| 1. Much more seriously | 2. A little more seriously | 3. A little less seriously | 4. Much less seriously |
|------------------------|----------------------------|----------------------------|------------------------|

Form 2 - Beck Depression Inventory

SEX M F

INSTRUCTIONS TO THE BECK INVENTORY

On this questionnaire are groups of statements. Please read each group of statements carefully. Then pick out the one statement in each group which best describes the way you have been feeling the PAST WEEK, INCLUDING TODAY! Circle the number beside the statement you picked. If several statements in the group seem to apply equally well, circle each one. Be sure to read all the statements in each group before making your choice.

1. 0 I do not feel sad.
 1 I feel sad.
 2 I am sad all the time and I can't snap out of it.
 3 I am so sad or unhappy that I can't stand it.
2. 0 I am not particularly discouraged about the future.
 1 I feel discouraged about the future.
 2 I feel I have nothing to look forward to.
 3 I feel that the future is hopeless and that things cannot improve.
3. 0 I do not feel like a failure.
 1 I feel I have failed more than the average person.
 2 As I look back on my life, all I can see is a lot of failures.
 3 I feel I am a complete failure as a person.
4. 0 I get as much satisfaction out of things as I used to.
 1 I don't enjoy things the way I used to.
 2 I don't get real satisfaction out of anything anymore.
 3 I am dissatisfied or bored with everything.
5. 0 I don't feel particularly guilty.
 1 I feel guilty a good part of the time.
 2 I feel quite guilty most of the time.
 3 I feel guilty all of the time.
6. 0 I don't feel I am being punished.
 1 I feel I may be punished.
 2 I expect to be punished
 3 I feel I am being punished.
7. 0 I don't feel disappointed in myself.
 1 I am disappointed in myself.
 2 I am disgusted with myself.
 3 I hate myself.
8. 0 I don't feel I am any worse than anybody else.
 1 I am critical of myself for my weaknesses or mistakes.
 2 I blame myself all the time for my faults.
 3 I blame myself for everything bad that happens.
9. 0 I don't have any thoughts of killing myself.
 1 I have thoughts of killing myself, but I would not carry them out.
 2 I would like to kill myself.
 3 I would kill myself if I had the chance.
10. 0 I don't cry anymore than usual.
 1 I cry more now than I used to.
 2 I cry all the time now.
 3 I used to be able to cry, but now I can't cry even though I want to.
11. 0 I am no more irritated now than I ever am.
 1 I get annoyed or irritated more easily than I used to.
 2 I feel irritated all the time now.
 3 I don't get irritated at all by the things that used to irritate me.

12. 0 I have not lost interest in other people.
 1 I am less interested in other people than I used to be.
 2 I have lost most of my interest in other people.
 3 I have lost all of my interest in other people.
13. 0 I make decisions about as well as I ever could.
 1 I put off making decisions more than I used to.
 2 I have greater difficulty in making decisions than before.
 3 I can't make decisions at all anymore.
14. 0 I don't feel I look any worse than I used to.
 1 I am worried that I am looking old or unattractive.
 2 I feel that there are permanent changes in my appearance that make me look unattractive.
 3 I believe that I look ugly.
15. 0 I can work about as well as before.
 1 It takes an extra effort to get started at doing something.
 2 I have to push myself very hard to do anything.
 3 I can't do any work at all.
16. 0 I can sleep as well as usual.
 1 I don't sleep as well as I used to.
 2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
 3 I wake up several hours earlier than I used to and cannot get back to sleep.
17. 0 I don't get more tired than usual.
 1 I get tired more easily than I used to.
 2 I get tired from doing almost anything.
 3 I am too tired to do anything.
18. 0 My appetite is no worse than usual.
 1 My appetite is not as good as it used to be.
 2 My appetite is much worse now.
 3 I have no appetite at all anymore
19. 0 I haven't lost much weight, if any, lately.
 1 I have lost more than 5 pounds.
 2 I have lost more than 10 pounds.
 3 I have lost more than 15 pounds.

I am purposely trying to lose weight by eating less. Yes ___ No ___

20. 0 I am no more worried about my health than usual.
 1 I am worried about physical problems such as aches and pains, or upset stomach, or constipation.
 2 I am very worried about physical problems and it's hard to think of much else.
 3 I am so worried about my physical problems that I cannot think about anything else.
21. 0 I have not noticed any recent change in my interest in sex.
 1 I am less interested in sex than I used to be.
 2 I am much less interested in sex now.
 3 I have lost interest in sex completely.

Form 3 - State Anger Scale

SELF ANALYSIS QUESTIONNAIRE

Directions: A number of statements that people use to describe themselves are given below. Read each statement and then circle the appropriate number to indicate how you feel right now. There are no right or wrong answers. Do not spend too much time on any one statement but circle the answer which seems to describe your present feelings best.

	NOT AT ALL	SOME- WHAT	MODER- ATELY	VERY MUCH
1. I am furious.....	1	2	3	4
2. I feel like banging on the table.	1	2	3	4
3. I feel angry.....	1	2	3	4
4. I feel like yelling at somebody..	1	2	3	4
5. I feel like breaking things.....	1	2	3	4
6. I am mad.....	1	2	3	4
7. I feel irritated.....	1	2	3	4
8. I feel like hitting someone.....	1	2	3	4
9. I am burned up.....	1	2	3	4
10. I feel like swearing.....	1	2	3	4

Form 4 - MAACL

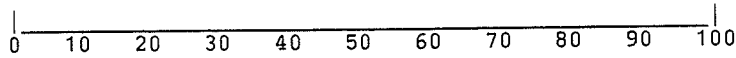
ADJECTIVE CHECKLIST

Directions: On this sheet you will find words which describe different kinds of moods and feelings. Mark an X in the box beside the words which describe how you are feeling RIGHT NOW. Some of the words may sound alike, but we want you to CHECK ALL THE WORDS THAT DESCRIBE YOUR FEELINGS. Work as quickly as you can.

- | | | | | | |
|----|----------------|----|----------------|-----|-----------------|
| 1 | ▫ active | 45 | ▫ fit | 89 | ▫ peaceful |
| 2 | ▫ adventurous | 46 | ▫ forlorn | 90 | ▫ pleased |
| 3 | ▫ affectionate | 47 | ▫ frank | 91 | ▫ pleasant |
| 4 | ▫ afraid | 48 | ▫ free | 92 | ▫ polite |
| 5 | ▫ agitated | 49 | ▫ friendly | 93 | ▫ powerful |
| 6 | ▫ agreeable | 50 | ▫ frightened | 94 | ▫ quiet |
| 7 | ▫ aggressive | 51 | ▫ furious | 95 | ▫ reckless |
| 8 | ▫ alive | 52 | ▫ gay | 96 | ▫ refected |
| 9 | ▫ alone | 53 | ▫ gentle | 97 | ▫ rough |
| 10 | ▫ amiable | 54 | ▫ glad | 98 | ▫ sad |
| 11 | ▫ amused | 55 | ▫ gloomy | 99 | ▫ safe |
| 12 | ▫ angry | 56 | ▫ good | 100 | ▫ satisfied |
| 13 | ▫ annoyed | 57 | ▫ good-natured | 101 | ▫ secure |
| 14 | ▫ awful | 58 | ▫ grim | 102 | ▫ shaky |
| 15 | ▫ bashful | 59 | ▫ happy | 103 | ▫ shy |
| 16 | ▫ bitter | 60 | ▫ healthy | 104 | ▫ soothed |
| 17 | ▫ blue | 61 | ▫ hopeless | 105 | ▫ steady |
| 18 | ▫ bored | 62 | ▫ hostile | 106 | ▫ stubborn |
| 19 | ▫ calm | 63 | ▫ impatient | 107 | ▫ stormy |
| 20 | ▫ cautious | 64 | ▫ incensed | 108 | ▫ strong |
| 21 | ▫ cheerful | 65 | ▫ indignant | 109 | ▫ suffering |
| 22 | ▫ clean | 66 | ▫ inspired | 110 | ▫ sullen |
| 23 | ▫ complaining | 67 | ▫ interested | 111 | ▫ sunk |
| 24 | ▫ contented | 68 | ▫ irritated | 112 | ▫ sympathetic |
| 25 | ▫ contrary | 69 | ▫ jealous | 113 | ▫ tame |
| 26 | ▫ cool | 70 | ▫ joyful | 114 | ▫ tender |
| 27 | ▫ cooperative | 71 | ▫ kindly | 115 | ▫ tense |
| 28 | ▫ critical | 72 | ▫ lonely | 116 | ▫ terrible |
| 29 | ▫ cross | 73 | ▫ lost | 117 | ▫ terrified |
| 30 | ▫ cruel | 74 | ▫ loving | 118 | ▫ thoughtful |
| 31 | ▫ daring | 75 | ▫ low | 119 | ▫ timid |
| 32 | ▫ desperate | 76 | ▫ lucky | 120 | ▫ tormented |
| 33 | ▫ destroyed | 77 | ▫ mad | 121 | ▫ understanding |
| 34 | ▫ devoted | 78 | ▫ mean | 122 | ▫ unhappy |
| 35 | ▫ disagreeable | 79 | ▫ meek | 123 | ▫ unsociable |
| 36 | ▫ discontented | 80 | ▫ merry | 124 | ▫ upset |
| 37 | ▫ discouraged | 81 | ▫ mild | 125 | ▫ vexed |
| 38 | ▫ disgusted | 82 | ▫ miserable | 126 | ▫ warm |
| 39 | ▫ displeased | 83 | ▫ nervous | 127 | ▫ whole |
| 40 | ▫ energetic | 84 | ▫ obliging | 128 | ▫ wild |
| 41 | ▫ enraged | 85 | ▫ offended | 129 | ▫ willful |
| 42 | ▫ enthusiastic | 86 | ▫ outraged | 130 | ▫ wilted |
| 43 | ▫ fearful | 87 | ▫ panicky | 131 | ▫ worrying |
| 44 | ▫ fine | 88 | ▫ patient | 132 | ▫ young |

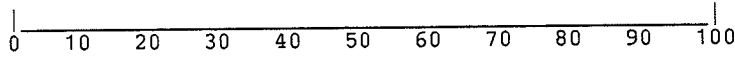
Form 5 - Judgement of Control Scale

1. a) On the scale below please indicate with a vertical line how much control you had over the appearance of the red light. 0 would indicate no control at all and 100 would indicate that you had complete control over the red light.

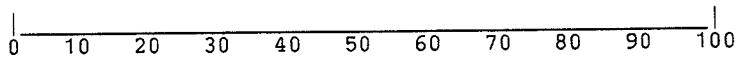


- b) How certain are you at the accuracy of your answer?
 Not Somewhat Very
 1 2 3 4 5

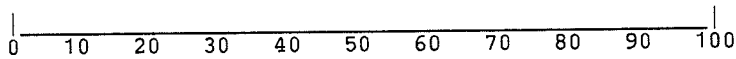
2. Please indicate on the scale below what percentage of the trials resulted in the red light being turned on.



3. For the trials on which you pressed the button, please indicate what percentage of the trials resulted in the red light being turned on.



4. For the trials on which you did not press the button, please indicate what percentage of the trials resulted in the red light being turned on.



5. What evidence convinced you that you had the amount of control you indicated in Question 1?

6. Did you test any complex type of scheme (time or pattern dependant) to control the red light?

YES

NO

If yes, what did you try and which one or ones worked?

worked

Y N

Y N

Y N

Appendix B

INSTRUCTIONS TO SUBJECTS

Now in this problem-solving experiment, it is your task to learn how to turn on this red light. Each time the green light comes on indicates the start of a new trial, the occasion to do something. For each trial, after the green light comes on, you have the option of either making a button press response or not making a button press response. A button press response consists of pressing this button once and only once immediately after the green light comes on. Not making a button press response consists, of course, of doing nothing when the green light comes on. If you do intend to press the button on a given trial, you must press within three seconds after the green light comes on; otherwise the trial will be counted as a not press trial. So, in this experiment there are only two possibilities as to what you can do on each of the trials: either press the button within three seconds after the green light comes on, or else, just sit back and do nothing.

You may find that the red light will go on, on some percentage of the trials on which you do make a button press response. You may also find that the red light will go on, on some percentage of the trials when you do not make a button press response. Alternatively, you may find that the red light will not go on, on some percentage of the trials on which you do make a button press response, and you may find that the red light will not go on, on some percentage

of the trials when you do not make a button press response. So, there are four possibilities as to what may happen on any given trial:

1. You press and the red light does come on;
2. You press and the red light does not come on;
3. You don't press and the red light does come on;
4. You don't press and the red light does not come on.

Since it is your job to learn how to turn on the red light, it is to your advantage to press on some trials and not on others, so you know what happens when you don't press as well as when you do press.

Moreover, how often the red light comes on in this problem will determine how many credits you earn in this experiment. On each trial on which the red light comes on you will receive 5 points. You will receive one additional credit for each (40, 90 or 120 depending on the number of trials to be given) points you earn. Each time you earn points a '+5' will be displayed on the screen in front of you. So, in general, the more successful you are in producing the red light, the more credits you will earn.

(Subjects will be shown the Judgement of Control scale at this point).

N (16, 32, 48) trials will constitute the problem. After the problem, you will be asked to indicate your judgement of control by putting a vertical line someplace on this scale: at 100 if you have complete control over the onset of the red light, at 0 if you have no control over the onset of the red light, and somewhere between these extremes if you have

some but not complete control over the onset of the red light. Complete control means that the onset of the red light on any given trial is determined by your choice of responses, either pressing or not pressing. In other words whether or not the red light goes on is totally determined by whether you choose to press or to just sit back and not press. No control means that you have found no way to make response choices so as to influence in any way the onset of the red light. In other words, the onset of the red light has nothing to do with what you do or don't do. Another way to look at having no control is that whether or not the red light comes on, on any given trial, is totally determined by factors such as chance or luck, rather than by your choice of pressing or not pressing. Intermediate degrees of control means that your choice of responses, either pressing or not pressing, influences the onset of the red light even though it does not completely determine whether the red light goes on or not. In other words, what you do or don't do matters to some extent but not totally. Another way to look at having intermediate control is that one response either pressing or not pressing, produces the red light onset more often than does the other response. So, it may turn out that you will have no control, that is, your responses will not affect the onset of the red light, or it may turn out that you will have some degree of control, either complete or intermediate, that is, one response produces the red light onset more often than does the other. Any questions before we begin?