

EFFECTS OF CHOICE AND ENVIRONMENTAL CONTROL
ON THE PERCEPTION OF CONTROL

by

Florentius Chan

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APPROVED:

Lawrence C. Perlmuter, Chairman

Thomas H. Ollendick

Christopher M. Peterson

George A. Clum

James D. Moran

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(ABSTRACT)

The purpose of this study was to investigate the effects of choice and environmental control on perceived control. A paired associate choice task was presented to all subjects and they were allowed to choose the response terms to be learned. When each of the response words was chosen aloud, the screen on which the words were printed went blank in the 100% implicit control and 100% explicit control groups. In the latter group, the subjects were informed a priori that the words would be removed from the screen, while in the no-control group, the screen did not go blank when the subjects responded. In the 50% implicit control and 50% explicit control groups, the screen went blank upon responding on a random half of the decision trials. Half of the subjects received an uncontrollable continuous white noise (90 dB) throughout the decision trials, while no noise was presented to the remainder. Upon completion of the choice task, subjects were presented with a dice game, which measured the generalized effects of perceived control. The relationships between environmental control and per-

ceived control were different in the explicit control and implicit control conditions. In the presence of noise, environmental control produced an increment in the perception of control. Finally, consistent environmental control produces greater perceived control than does random control. The motivation model and applications of environmental control were discussed.

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Table of Contents

	page
Acknowledgements.....	iv
List of Tables.....	vi
List of Figures.....	vii
Introduction.....	1
Method.....	46
Results.....	54
Discussion.....	78
Conclusion.....	88
References.....	93
Appendix A: Word Sets.....	103
Appendix B: Instructions.....	105
Appendix C: Memory Task and Questionnaire.....	110
Appendix D: Raw Data: Decision Times.....	114
Appendix E: Raw Data: Questionnaire.....	125
Vita.....	136

LIST OF TABLES

<u>Table</u>	<u>page</u>
1. Mean and Standard Deviation of Decision Times	55
2. Pearson Correlations Between Decision Times, Behavioral Measures, and Self-reports of Perceived Control	57
3. Group Means on Self-Reports of Perceived Control Over the Exposure Durations and in Overall Experiment .	61

LIST OF FIGURES

<u>Figure</u>	<u>page</u>
1. Relationship between mean recall and mean decision times for 100% explicit control and 100% implicit control groups in noise condition.....	68
2. Relationship between mean perceived control over exposure durations and mean decision times for 100% explicit control and 100% implicit control groups in noise condition.....	69
3. Relationship between mean bet size and mean decision times for 50% explicit control and 50% implicit control groups in noise condition.....	72
4. Relationship between mean perceived control over exposure durations and mean residual variance for 100% explicit control and 100% implicit control in noise condition.....	75
5. Relationship between mean perceived control in experiment and mean residual variance for 100% explicit control and 100% implicit control groups in noise condition.....	76

INTRODUCTION

A topic of considerable interest in contemporary psychology is perceived control. Numerous research has been conducted on the perception of control (e.g., Corah & Boffa, 1970; Harvey & Harris, 1975; Kehoe, 1979; Perlmutter & Monty, 1977) and related areas such as stress (e.g., Geer, Davison, & Gatchel, 1970; Glass & Singer, 1972a, 1972b; Staub & Kellet, 1972) and learned helplessness (e.g., Hiroto, 1974; Miller & Seligman, 1975, 1976; Roth & Bootzin, 1974; Teasdale, 1978). In fact, this topic is not new. Perceived control had been studied both by personologists (e.g., Murray, 1938, 1954; White, 1959) and social psychologists (e.g., Heider, 1958; Phares, 1957; Rotter, 1954) as far back as forty years ago. Murray (1938) identified many personal needs (e.g., abasement, achievement, affiliation, autonomy, etc.). One of these is of particular importance-- the "effect need", which refers to the attempt to bring about a particular desired effect or goal which is extrinsic to the activity in which one is engaged. Similar to Murray's notion that people have a need to achieve their goal, White (1959) dichotomized such a need into two types of motiva-

tion, namely, effectance motivation and competence motivation. Effectance motivation is the attempt to produce effects through one's action, whereas competence motivation is the attempt to achieve competence in one's functioning.

Similarly, social psychologists (e.g., deCharms, 1968; Heider, 1958; Kelly, 1971, 1973; Phares, 1957; Rotter, 1966; Weiner, 1974) stressed perceived personal causation and the processes (attributions) that people use to infer the causes of their own behavior as well as those of others. Specifically, Rotter (1966) developed a locus-of-control scale to differentiate people who generally believe that events are contingent upon their own behaviors (internals) vs. those who believe that events are contingent upon environmental influences (externals). Weiner (1974) further elaborated the stated attributions into two causal dimensions: locus of control (internal vs. external) and stability (stable vs. unstable). Locus of control refers to the causes that are either internal to the person (e.g., ability, effort) or external (e.g., luck, task difficulty). Stability refers to the causes that are either stable (e.g., ability, task difficulty) or unstable (e.g., effort, luck).

The early concepts of perceived control have influenced the development of other related theories (e.g., Brehm's reactance theory, 1966; Perlmutter and Monty's motivation

model of perceived control, 1977; Seligman's learned helplessness model, 1975). Thus, research on the theories and application of perceived control has proliferated.

Perceived control has been found to play a significant role in learning, social psychology, psychopathology, behavior therapy, and environmental psychology (Harvey, Harris, & Lightner, 1979). In learning research, subjects who have some control over the materials to be learned demonstrate better performance on subsequent memory tasks (Perlmutter & Monty, 1973, 1977). Similarly, Brigham (1979) reported that school children who have control over the nature of reinforcers and the content of the curriculum perform much better academically than those who do not have such control.

In social psychology, perceived control is a major variable in Brehm's reactance theory (1966, 1972). According to this theory, the perceived loss of personal control causes the individual to experience psychological reactance, i.e., a motivational state directed toward the reestablishment of control. Similarly, research (e.g., Bandler, Madaras, & Bem, 1968; Corah & Boffa, 1970) has shown that perceived control is a determinant of the cognitive appraisal of threat. Specifically, Corah and Boffa (1970), based on the results of their study, suggested that "a procedure which gives the subject the choice of avoiding or not avoid-

ing the aversive consequences of a stimulus is equivalent to giving him perceived control over the potential threat" (p. 4).

In the study of psychopathology, Arnkoff and Mahoney (1979) stated that "persons who are regarded as psychopathological may be characterized according to the manner in which their model of personal control is discrepant from the shared societal assumptions" (p. 155). The processes relating psychopathology and control, according to these authors, include deviant beliefs about control (e.g., depression), deficits in control skills (e.g., phobia), and an inappropriate assertion of control (e.g., hysterical neurosis).

Many authors (e.g., Bandura, 1977; Seligman, 1981; Wilson, 1979) have suggested that enhancement of a client's perceived control is a significant antidote in behavior therapy for phobias and depression. Specifically, Bandura's (1977) theory of personal efficacy suggests that the effectiveness of psychological treatment relies upon increasing the client's expectation of personal efficacy or perception of control. Similarly, Wilson (1979) stated that the effectiveness of relaxation training lies in the encouragement of clients to acquire greater control over their emotions by deliberately tensing and relaxing themselves. To increase clients' compliance, Mahoney (1974) suggested that thera-

pists should foster an increase in the clients' perceived control in the therapeutic process by providing a choice between alternative therapeutic prescriptions.

In environmental psychology, Glass and Singer (1972a, 1972b) have found that people with no control over the noise in their environment are more stressed than those who have control, whether or not they exercise such control. Similarly, people who have no control over their personal space (crowding) are more likely to develop learned helplessness (Baum, Aiello, & Calesnick, 1978), high blood pressure (D'Atri, 1975) and physical illness (McCain, Cox, & Paulus, 1976).

Although the effects of perceived control and its absence have been investigated in a variety of situations, little is known about the development of perceived control and the relationship between perceived control and performance. Nevertheless, some theories have been proposed to explain how perceived control develops and how it affects performance; these are need theories, reinforcement theories, prediction model, and motivation model. Among these theories, the motivation model proposed by Perlmutter and Monty (1977) appears promising. One of the major purposes of the present study is to test aspects of this model. Before examining the details of this theory, a brief review

of some competing theoretical conceptualizations will be undertaken.

Need Theories

Strong empirical evidence (e.g., Corah & Boffa, 1970; Geer, Davison, & Gatchel, 1970; Glass & Singer, 1972a, 1972b; Klein, Fencil-Morse, & Seligman, 1976; Miller & Seligman, 1975; Seligman & Maier, 1967) has demonstrated that to varying degrees, people prefer control, and furthermore, are likely to develop depression and learned helplessness when control is lost. Thus, many authors have concluded that people have a strong desire or need to exercise control over the environment (Averill, 1973; Bandura, 1977; Brehm, 1966, 1972; Glass & Singer, 1972a, 1972b). Specifically, Renshon (1979) borrowed conceptions from Freud's (1959) psychoanalytic theory and Murray's (1938) need theory to explain the need for personal control. Both Freud and Murray argued that individuals seek to rid themselves of tension or conflicts which provoke anxiety. The greater the tension, the greater the drive and the more likely the individual is, up to a point, to seek control to reduce the tension. For Freud, the source of the drive is primarily sexual. For Murray, the drive could be social as well as biological. In essence, these concepts are similar to

Hull's (1952) drive reduction theory in which Hull argued that people are motivated to engage in certain responses to reduce their drives in order to restore homeostasis.

Somewhat related to the drive concept is White's (1959) notion of competence motivation. According to White, there is a strong need or drive to achieve competence and mastery over the environment. In an attempt to explain how perceived choice or perceived control could affect performance, Harvey, Harris, and Lightner (1979) suggested that individuals' competence motivation is high when the perceived choice is high. They further concluded that "thus, Monty, Perlmutter, and associates appear to be enhancing competence motivation when they present subjects with choice in forming stimulus-response links on the paired-associate task" (p. 287).

On the other hand, Seligman and Miller (1979) argued that "... the existence of such a drive does not appear to be independently verifiable of the fact that control is preferred and less stressful" (p. 356). Although control is preferred, there is no direct evidence that such control is needed. There seems to be no direct measure of one's need or drive. That is, need or drive (e.g., thirst) is usually inferred from one's instrumental responses (e.g., drinking). However, the role of these instrumental responses is often

complicated by reinforcement. Both explanations such as "he is drinking because he is thirsty" and "he is drinking because drinking satisfies his need" may be circular unless the antecedent conditions are manipulated.

Similarly, a newborn baby cries when he or she is uncomfortable (e.g., hunger, pain), and the cry is usually rewarded (drawing people's attention). Thus, the separation of need and reinforcement is often difficult. Some might also notice that a baby may cry when he or she is left alone or awakened. If crying is considered as the expression of the need for control, is this need basic (biological), or is it in the service of other needs (e.g., reduction of anxiety due to separation or uncertainty)? Control over the environment, therefore, is likely more than just a biological need.

According to Renshon (1979), the need for personal control arises out of the complex interplay between somatically based needs and socially based satisfactions. That is, people use instrumental responses to influence (control) the environment, and when such responses are rewarded, additional efforts at control can be expected. Furthermore, Renshon (1979) suggested that "in short, the experience of control becomes a source of reward not only because it brings about need satisfaction but also because it reduces

anxiety" (p. 47). In line with this notion, Singer (1979), in a discussion of the desire for choice, proposed that "... people in search of control, exercise choice and are reinforced by a set of positive consequences to want more of it, thus strengthening a need to achieve control and the use of choice to obtain it" (p. 344). Recently, Burger and Cooper (1979) reported that there are individual differences in the need for personal control, which support the notion that the developmental history of the need for control is likely different among people.

Reinforcement Theories of Control

Earlier discussion revealed that reinforcement plays a significant role in the development and maintenance of responses related to control. Similarly, in Hull's (1952) drive reduction theory, although drive (D) is one of the major determinants of behavior, the incentive motivation (K) is also a critical variable affecting the organism's total motivation. In reinforcement theories (e.g., Estes, 1962; Skinner, 1958; Thorndike, 1911), behavior is primarily determined by the value of reinforcers. When control responses are followed by some kind of reinforcement, control responses are thereby reinforced. Empirical support for this argument can be found in stress and helplessness

studies. In most of these studies (e.g., Bowers, 1968; Haggard, 1943; Seligman & Maier, 1967; Staub, Tursky, & Schwartz, 1971), subjects who had control over the intensity, administration, and termination of noise or shock did not develop stress and helplessness relative to those who had no control. Obviously, there are some incentives for such control, and people are likely to prefer situations which permit the exercise of control. The results of the above experiments also support Renshon's (1979) position that control over the environment (e.g., noise, shock) is in the service of more basic needs (e.g., adaptation, avoidance of pain).

However, there is some empirical evidence indicating that the reinforcement notion may be inadequate to explain the need for control and the consequences of control. Similar to the study performed by Glass, Singer, and Friedman (1969), Glass and Singer (1972b) conducted an experiment to evaluate the effects of perceived control on the consequences of unpredictable noise. Two groups of subjects listened to the unpredictable noise taped at 108 dB. One group (Perceived Control) was given a microswitch attached to the side of a chair which would terminate the noise for the remainder of the session when pressed. The other group (No Perceived Control) did not receive this option. However,

the subjects in the Perceived Control group were encouraged not to press the switch but were informed that the choice was available nevertheless. In fact, very few subjects in the Perceived Control group used the switch. The post-experimental questionnaires revealed that Perceived Control subjects felt more control than did No Perceived Control subjects. Moreover, the aftereffects of such control showed that Perceived Control subjects, compared to the No Perceived Control subjects, had higher frustration tolerance and better task performance. These results were replicated in subsequent studies (Glass & Singer, 1972b). Notice that very few Perceived Control subjects in these experiments exercised their control (pressing the control button). The reinforcement principle generally has no difficulties in explaining how certain responses are strengthened, yet it is difficult to explain how the absence of a response can be strengthened by the operation of reinforcement.

Prediction Model of Control

A substantial amount of research has demonstrated that subjects prefer immediate shocks to delayed shocks (Maltzman & Wolff, 1970), signaled shocks to unsignaled shocks (Pervin, 1963), self-administered shocks to experimenter-administered shocks (Haggard, 1943), periodic noise to aperiodic

noise (Glass & Singer, 1972a). One factor common to all these conditions (e.g., signaled shock, immediate shock, etc.) is predictability or reduction of uncertainty. It may be helpful to examine the effects of predictability on performance. In a review of studies on stress, Averill (1973) suggested that "the reduction of uncertainty was a much more potent variable than behavioral control" (p. 288). However, there are very few experiments which investigated the relative significance of predictability and controllability. One major obstacle to such investigation is that predictability and controllability are not always mutually exclusive. Thus, separation of effects due to these variables is difficult.

Needless to say, subjects who can control the aversive noise or shock can also predict its occurrence. On the other hand, for predictable aversive stimuli (e.g., periodic noise, self-administered shock), although some subjects cannot terminate these stimuli, they can, however, control their own physiological and emotional state, thereby managing the extent of their reactions to the aversive stimulation. For example, in systematic desensitization of snake phobia, the therapist usually asks the client to imagine scenes relevant to the phobic situation while the client is relaxing and galvanic skin response (GSR) activity is low.

Low GSR is often associated with muscle relaxation, and this state is incompatible with emotional arousal. Thus, the generated stress is reduced.

However, predictability also plays a role in this scenario. Notice that therapists generally start with a phrase such as "Now, I want you to shift your attention to...." or "Now, I want you to imagine yourself in a situation...." before presenting the stressful scene. These phrases can be considered as signals (conditioned stimuli) to the subjects that the stressful scene (unconditioned stimulus) will commence. In other words, all phobic situations presented in systematic desensitization, cognitively or in vivo, are signaled or predictable. Since occurrences of some phobic objects (e.g., snake, rat) are unpredictable in nature, the usefulness of classical conditioning in combatting phobias may be minimal. Besides the effects of classical conditioning, predictability may contribute to a sense of control through temporal contiguity. In many situations, prediction is paired with control, and thus, prediction brings about the perception of control.

Empirical support for the notion that prediction is important in stress management can be found in a study by Glass, Singer, and Friedman (1969). The galvanic skin response (GSR) was monitored for subjects who received pre-

dictable or unpredictable noise. It was found that the magnitude and rate of adaptation were virtually identical in predictable and unpredictable noise conditions. However, subjects who received unpredictable noise demonstrated impaired task performance and lowered tolerance for frustration when compared to subjects who received predictable noise. Both groups of subjects showed equivalent adaptation to the noise. On the other hand, when subjects received unpredictable noise, those who had control over the termination of noise showed neither performance decrements nor low frustration tolerance (Glass & Singer, 1972b).

As reviewed earlier, only a few Perceived Control subjects in Glass and Singer's (1972b) study exercised their control (pressing the control button); however, the putative belief that they had such control was sufficient to reduce the negative aftereffects of unpredictable noise. Recently, Burger and Arkin (1980) examined the confound of control and prediction in learned helplessness research. Results indicated that either the perception of control or predictability concerning the aversive event was sufficient to mitigate learned helplessness; however, the authors admitted that the study was not a strong test because of the methodological problem in separating predictability from control. It seems that a more sophisticated procedure has to be employed to make a clear distinction between prediction and control.

Motivation Model of Control

The last model of control to be discussed is the motivation model proposed by Perlmutter and Monty (1977). This model derives its support from a number of learning based paradigms (Monty & Perlmutter, 1972, 1975; Perlmutter & Monty, 1973; Perlmutter, Monty, & Kimble, 1971). In these studies, some subjects chose the words, stimuli or responses, they elected to learn either for themselves or for other subjects. Performance was improved on a subsequent memory test for those who had control relative to a comparison group. One might conjecture that the enhanced performance was due to the fact that the choice subjects in some of these studies had the advantage of associating the words in certain idiosyncratic ways that would aid their later recall. However, this contention was found untenable (Monty, Rosenberger, & Perlmutter, 1973).

In explaining these findings, Perlmutter and Monty (1977) suggested that the exercise of choice enhances the subject's general level of motivation. Motivation, in turn, functions as an energizer of all behaviors, following the conception of drive (D) earlier suggested by Hull (1952). That is, the exercise of a free or unconstrained choice contributes to the perception of control which in turn enhances motivation, thereby facilitating performance. However, as a

result of choosing, a potential for frustration is also developed. If activated, as by forcing the subjects to learn nonchosen materials, it leads to a heightened but nonoptimal level of motivation, and performance is impaired (Perlmutter, Monty, & Cross, 1974). The abrogation of the subject's control also can be considered similar to an increase in reactance (Brehm, 1966), which may lead to an effort at regaining control.

In a study performed by Monty, Geller, Savage, and Perlmutter (1979), subjects who were allowed to choose between response pairs that were highly dissimilar in meaningfulness learned no better than yoked force subjects who were not permitted to choose. The authors concluded that it is not the act of choosing per se that leads to improved performance but the extent to which the subjects perceive that an attractive or meaningful choice was offered. In line with this notion, Steiner (1979) proposed that only an autonomous choice between two highly desirable options produces a sense of control. A variety of studies have supported this notion (Harvey & Harris, 1975; Harvey & Jellison, 1974; Harvey & Johnston, 1973; Jellison & Harvey, 1973; Kehoe, 1979).

Since task performance was improved after choosing from among meaningful response pairs in a paired-associate task,

one might speculate that the enhanced motivation induced from perceived control is a general state rather than a specific state. Strong empirical support for this hypothesis can be found in the study conducted by Monty, Rosenberger, and Perlmutter (1973). Results indicated that when subjects chose only the first three response items in a 12-item paired-associate list and were assigned the remaining nine responses, performance was nearly as good as when all 12 items were chosen. Furthermore, Perlmutter, Scharff, Karsh, and Monty (1980) demonstrated that the heightened motivation resulting from choice is generalizable to another task (reaction time) over which no choice was permitted.

Compared to other models of control, the motivation model appears to provide a more precise framework to explain how perceived control enhances task performance. Different from the other models of control, the motivation model was originally derived from studies of decision-making and choice. Thus, the applicability of this model to the study of control remains to be seen. Although many authors (Harvey & Johnston, 1973; Jellison & Harvey, 1973; Langer & Rodin, 1976; Lefcourt, 1973; Savage, Perlmutter, & Monty, 1979; Steiner, 1979) assumed that perceived control developed from choice is similar to that developed from control, no study has empirically examined this assumption.

Moreover, the results of a study on control by Revesman and Perlmutter (1981) failed to support the motivation model.

In Revesman and Perlmutter's study, a number of conditions were examined. The Early Explicit Control and Early Implicit Control groups are particularly relevant. The Early Explicit Control subjects were told beforehand that the screen on which the paired-associate item was presented would "sometimes" go blank after their announcement of the chosen response word. No such information was given to the Early Implicit Control subjects. In fact, both groups controlled the duration of the words in the first four of the total 14 trials. Results indicated that the decision latencies of both groups increased immediately after control was removed, suggesting that the enhanced motivation resulting from perceived control in early control trials failed to generalize to the remaining noncontrol trials. This finding appeared to contradict the findings of Monty et al. (1973) which showed that enhanced motivation resulting from the early choice trials generalized to the remaining no-choice trials. Furthermore, the failure of early control to generalize to noncontrol trials also contradicts the results of another study (Perlmutter et al., 1980) which demonstrated that the beneficial effects of choice over paired-associates generalized to an apparently unrelated reaction time task.

Also, from the standpoint of Brehm's (1966) reactance theory, it would be expected that the loss of control should result in faster responses.

One possible explanation for this apparent discrepancy is that perceived control stemming from control is different from perceived control stemming from choice, even though both increase motivation. This argument is based on the observation that choice and control each has unique characteristics. As Harvey and Jellison (1974) reported, people perceive greater control when they are uncertain about the outcomes of the choices than when they are certain. Moreover, the consequences of their choices are usually delayed rather than immediate. For example, a customer in a restaurant who chooses chicken noodle soup rather than vegetable soup does not know whether he or she made a good choice until the soup is tasted. On the other hand, the outcome of control may be more salient since its consequence is immediate. For example, a man realizes immediately that he has control over the room temperature in a hotel when he manipulates the thermostat. Thus, people are more immediately certain about the outcome of their control than the outcome of their choice. Since control is usually situationally specific and its outcome is immediate, the effects of perceived control stemming from control may also be specific.

On the other hand, since the outcome of choice relies on some ambiguity, the effects of perceived control stemming from choice are more likely to be generalized to other situations.

However, the argument that the effects of control do not generalize to other situations is inconsistent with the results of many studies on control (e.g., Glass, Reim, & Singer, 1971; Glass & Singer, 1972a, 1972b) which showed that the effects of control generalize to other situations. Thus, the failure of Revesman and Perlmutter to demonstrate the effects of early control on the late no-control decision trials remains inconsistent with the findings of these studies and with the predictions of the motivation model. It is possible that the early control subjects in Revesman and Perlmutter's study did not perceive any control despite fast decision times on the early control trials. Unfortunately, no self-report measures of perceived control were gathered in their study and this explanation cannot be confirmed. Thus, one purpose of the present study will be to examine the generalized effects of control. Specifically, there are six major relationships to be examined in the present research: (1) explicate the effects of choice and control; (2) understand how explicitness of control affects perception of control; (3) understand how degree of control (50%

vs. 100%) affects perception of control; (4) evaluate the possible interactive effects of explicitness and degree of control; (5) study how the presence of a moderately aversive noise affects choice and control as well as perception of control; and (6) examine the effects of individual differences on perception of control. A brief discussion of these relationships is presented below.

Effects of Choice and Control

In this study, a procedure similar to the choice condition of Revesman and Perlmutter (1981) will be used. In addition, an uncontrollable noise condition will be employed, and its effects on motivation and perception of control will be studied. According to Perlmutter and Monty's motivation model, motivation should be enhanced as a result of perceived control stemming from choice and/or control. If decision times are a reliable measure of motivation, one would expect that higher motivation would result in shorter decision times. Since all subjects in this research will choose the words they want to learn, they should develop some perceived control stemming from choice. In addition to choice, the duration of the screen will be under the subjects' control (with the exception of the no-control condition), thus choice and control may be expected to sum with

respect to perceived control and lead to faster decision times than those expected when choice but no control is present.

Effects of Explicitness of Control

Control can be either explicitly or implicitly provided, and each is expected to have different effects on perception of control. For example, in mathematics text books, working-examples are often provided, and students are explicitly told how to solve the problems. Explicit instructions are written on nearly every product we use. Although explicitness of control has been used commonly, its impact on the perception of control has not been studied systematically. People who skillfully solve the Rubik's Cube without consulting the answer book or their friends should sense greater control than those who solve it with some help. Empirical evidence, as indexed by decision latencies, demonstrated that implicit control induces a greater perception of control than explicit control (Revesman & Perlmutter, 1981). The proposed study will examine the effects of explicitness of control on perceived control. In this study, the explicit control subjects will be told beforehand that their announcement of the chosen response word will cause the screen to go blank. This explicit response-

outcome contingency should attenuate the perception of control because subjects will sense that control is predetermined and is manipulated by the experimenter. In this condition, decision latencies are expected to be slower relative to those of the implicit control subjects who are not informed of the relationship between the announcement of the chosen word and the blanking of the screen. Although the implicit control subjects have control over the screen, they will presumably learn about this as they proceed through the decision trials. The learning of this relationship should contribute to the subjects' sense of control or efficacy (White, 1959) in dealing with the environment, and thus, the perception of control should be enhanced. Furthermore, the "discovery" of control should provide the subjects with the additional incentive to maintain control.

Effects of Degree of Control

In most of the perceived control studies (e.g., Glass & Singer, 1972a, 1972b; Langer, 1975; Wortman, 1975) subjects either had control over one event (aversive or nonaversive) or had no control at all. However, in the natural environment, people often have some degree of control rather than complete or no control. Does periodic control and continuous control have similar effects on perception of control?

That is, do individuals perceive a greater amount of control when they can exert continuous control than when they can exert periodic control over an event? Might the sporadic experience of control (partial control) magnify its effects more completely than continuous control? On the other hand, might the inherent uncontrollability eliminate the sense of control? Of the many perceived control studies conducted in recent years, few have investigated the effects of partial control vs. complete control. However, Sherrod, Hage, Halpern, and Moore (1977) found that subjects who had complete control over an aversive noise demonstrated better task performance than those who had partial control. On the other hand, there is evidence that 50% partial success training is more effective than 100% continuous success training in preventing subjects from developing learned helplessness (Jones, Nation, & Massad, 1977; Nation & Massad, 1978). It seems that further research is necessary to clarify the effects of complete control vs. partial control.

Interactive Effects of Explicitness and Degree of Control

Although some evidence has indicated that implicit control enhances the perception of control more than does explicit control (Revesman & Perlmutter, 1981) and that partial control training is more effective than complete con-

trol training (Jones, Nation, & Massad, 1977; Nation & Massad, 1978), no suggestion has been made about the possible interactive effects of explicitness and degree of control.

Specifically, it is predicted that the Explicit Control subjects will have higher motivation to exert their control and perceive greater control in a 100% schedule of control than in a 50% schedule. The information given to them in a 50% schedule that they "sometimes" would have control is vague, and it may attenuate their motivation and perception of control. On the contrary, the Implicit Control subjects will have higher motivation and perceive greater control in a 50% schedule than in a 100% schedule because the random 50% control may produce a more salient effect than consistent control.

Effects of an Uncontrollable Stimulus

Laboratory studies on stress and learned helplessness have demonstrated the negative impacts of uncontrollable noise or shock (e.g., Benson & Kennelly, 1976; Glass & Singer, 1972a, 1972b; Hiroto & Seligman, 1975). Most of these studies examined the aftereffects of an uncontrollable event. Little attention was paid to subjects' reaction during the experience of no-control. Understanding how subjects react to no-control experiences may suggest how lack of control and performance decrements are related. Thus,

the present study will permit a more continuous assessment of control and noncontrol in addition to a post-treatment evaluation. In the present study, half of the subjects will receive an uncontrollable noise (90 dB) during the decision making trials, and their decision latencies will be measured. It is expected that noise will provoke some tension in all subjects, thus enhancing the general level of motivation, which in turn will shorten decision times. Furthermore, the presence of uncontrollable noise may differentially affect the salience of choice and control in the paired-associate choice task. It is expected that noise may interact with different treatment conditions. In the implicit control condition, since the subjects are not informed about their control, they may simultaneously develop some illusion of control over the noise as well as the blanking of the screen. Furthermore, the illusion of control for subjects receiving the 50% control schedule is likely to be greater than those receiving the 100% control schedule because of the presumed salience of control in the 50% control schedule. Compared to those in the implicit control condition, subjects in the explicit control condition may be less likely to develop an illusion of control over the noise. Thus, both the 100% and 50% explicit control subjects will perceive little control over the noise.

Individual Differences and Perceived Control

Studies have shown that depressed individuals are less likely to develop an illusion of control (e.g., Alloy & Abramson, 1979; Golin, Terrell, & Johnson, 1977; Golin, Terrell, Weiz, & Drost, 1979). Besides depression, another individual difference variable related to the development of the perception of control is locus of control. Rotter (1979) suggested that locus of control and perceived control are closely related. Support for this suggestion can be found in many studies (e.g., Balch & Ross, 1975; Strickland, 1979; Ungerer, Harford, & Coloni, 1975) which have demonstrated that locus of control is a good predictor variable for success of treatment of various problems (e.g., hypertension, drug abuse, smoking, weight loss) in which client's perception of control plays a significant etiological role. Recently, Burger and Cooper (1979) developed a Desirability of Control (DC) scale which measures individual differences in the desire for control.

In sum, depression, locus of control, and desire for control are some individual difference variables which may relate to the development of perceived control. These variables will be measured in the proposed study such that additional information about subjects' personality variables can be obtained. Specifically, it is predicted that there will

be some interactive effects of these variables (depression, locus of control, and desire for control) with explicitness as well as degree of control. That is, depressed, external, and/or low desire-for-control individuals will have higher motivation to exert their control and perceive greater control in the explicit control and 100% control conditions than in the implicit control and 50% control conditions. The reasoning is that they are more certain of having control in the explicit control and 100% control conditions than in the implicit control and 50% control conditions. On the other hand, nondepressed, internal, and/or high desire-for-control subjects will have higher motivation to exert their control and perceive greater control in the implicit control and 50% conditions than in the explicit control and 100% control conditions because implicit control should be more effective than explicit control and 50% control is more salient than 100% control for these people.

Definition of Control

In the literature on perceived control, terms such as behavioral control, decisional control, cognitive control, perceived choice, perceived freedom, origin/pawn, internal/external control, implicit/explicit control, partial/complete control, outcome control, early control, environmental

control, and perceived control are often used interchangeably and often are not operationally defined. Seligman and Miller (1979), in the concluding comments in the book, Choice and Perceived Control (Perlmutter & Monty, 1979), addressed the need for a more sophisticated analysis of the interrelations between the terms used in the area of perceived control. To avoid terminological confusion, a brief discussion of the terms to be used in this paper is necessary.

Control refers to a change in some part of the organism's environment as a result of a specific behavior or a set of behaviors. When a change in the environment is invariably contingent upon the organism's behavior, that organism is said to have complete control (e.g., in Kish's (1955) study a dim light came on when the hungry rats pressed the bar in a Skinner Box). On the other hand, the organism is said to have partial control when the change in the environment is occasionally contingent upon his or her behavior (e.g., a dim light came on after 10 presses on the bar in a Skinner Box). Furthermore, control can be actual or illusory. Actual control refers to control that is valid and reliable for the actor (e.g., a policeman who enforces a law). Illusory control refers to control that lacks these features (e.g., a person who believes in control over the

outcome of the roll of the dice). Both actual control and illusory control can contribute to the perception of control. Perceived control is defined as a belief or expectation about control. The actual exercise of control is not critical. Rather, the perception or belief that such control is available is the only factor relevant to the development of perceived control (e.g., some people believe that they could influence the outcome of an election if they vote, however, they never vote). Similarly, choice or the opportunity to choose among alternatives in a situation can contribute to the perception of control over that situation (e.g., customers in a restaurant perceive the freedom to choose their favorite foods).

Explicit control and implicit control represent two routes by which control may be experienced initially. Explicit control refers to the control which is explicitly defined for the controller (e.g., policemen know well about their authority). On the other hand, implicit control refers to the control which is gained by the controller without prior information about the nature and/or consequences of the control (e.g., children misbehave in order to draw their parents' attention). The development of perceived control resulting from explicit control is dependent upon the prior information that such control is available,

and the actual exercise of such control may not be necessary. On the other hand, the development of perceived control through implicit control is dependent upon the intrinsic feedback received following the exercise of such control and thereby the actual experience of such control may be essential to its development.

Assessment Techniques

Most research on control (e.g., Baida, McBane, Suter, & Lewis, 1966; Ball & Vogler, 1971; Bowers, 1968; Geer, Davison, & Gatchel, 1970) has focused on the consequences of control vs. no control. The consequences have been measured in a variety of ways from self-reports to physiological measures. However, many researchers (e.g., Glass & Singer, 1972a, 1972b; Harvey & Harris, 1975; Langer, 1975; Wortman, 1975) also used these dependent variables to infer the amount of control subjects perceived during the experiment. It seems that there are no agreements about how best to measure perceived control. Thus, it is difficult to decide which dependent measures should be used in the present study. A review of the common assessment techniques for perceived control is undertaken.

In general, there have been five major assessment techniques for perceived control. These are: (1) self-report,

(2) psychophysiological assessment, (3) task performance, (4) expectancy for success, and (5) decision latency.

(1) Self-report

In many studies (e.g., Glass & Singer, 1972a, 1972b; Langer, 1975; Wortman, 1975) the indicator responses of perceived control were self-reports, either in the form of post-experimental questionnaires or post-experimental interviews. In either format, subjects were asked how much control they perceived or believed they had on a specific task during the experiment. In a series of studies on the determinants of perceived choice, Harvey and his associates (e.g., Harvey & Jellison, 1974; Harvey & Johnston, 1973; Jellison & Harvey, 1973) used self-reports as the major dependent measure, and the results supported the idea that "... perceived choice was greater (1) when there was a small difference in attractiveness of the possible actions than when there was a large difference and (2) when a person was uncertain about the attractiveness of each outcome than when he was certain" (Harvey & Jellison, 1974; p. 539).

Self-reports are generally assumed to reflect the operation of cognitive processes occurring during the experiment. However, in an extensive review of the usefulness of self-reports, Nisbett and Wilson (1977) suggested that sub-

jects may have little or no direct introspective access to their cognitive processes. These authors stated that the self-reports are often based on subjects' a priori, implicit causal theories or judgments about the extent to which a particular stimulus is a plausible cause of a given response. In a similar vein, Kehoe (1979) suspected that subjects might formulate hypotheses when asked by the experimenter about how much control or choice they perceived in an experiment. Thus self-reports might reflect subjects' self-perception (Bem, 1972) which are based upon responses to inquiries more than cognitive processes which occurred during the experiment. Furthermore, Steiner (1979) questioned the idea of employing self-reports as manipulation checks since these measures are often reactive.

A substantial amount of empirical evidence has shown that self-reports are often discrepant with other measures. In stress studies (e.g., Bandler, Madaras, & Bem, 1968; Glass, Singer, & Friedman, 1969; Lanzetta & Driscoli, 1966), subjects who had control over the aversive stimuli reported that they felt less stressful as indicated by their self-reported pain ratings, but GSR data provided only weak support for this outcome. Similarly, in learned helplessness studies (e.g., Cole & Coyne, 1977; Coyne, Metalsky, & Lavelle, 1980), subjects failed to report feelings of personal helplessness although they demonstrated performance decrements.

On the other hand, there are studies (e.g., Glass & Singer, 1972a, 1972b; Langer, 1975) indicating that self-reports are consistent with other measures. Thus, further investigations of the reliability and validity of self-reports must be completed before employing these as valid dependent measures of perceived control.

(2) Psychophysiological Assessment

In the early stress studies (e.g., Bandler, Madaras, & Bem, 1968; Corah & Boffa, 1970; Glass & Singer, 1972a; Glass, Singer, & Friedman, 1969; Lanzetta & Driscoli, 1966), subjects were provided with control or no control over aversive stimuli such as noise and shock, while the galvanic skin response (GSR) was used to measure the stress level of the subjects. Presumably, subjects who had control over the aversive stimulus would experience less stress than those who had no control, and the GSR of the former would be smaller than that of the latter. Empirical support for this hypothesis can be found in Stotland and Blumenthal's (1964) study. Subjects in one group were informed that they could take a series of intelligence tests in any order they desired, while a second group was told that they had to take the tests in a prescribed order. Subjects who had control over the order of the tests showed less of an increase in palmar sweating than did subjects who had no control.

However, as mentioned earlier, in many studies (e.g., Bandler, Madaras, & Bem, 1968; Glass, Singer, & Friedman, 1969; Lanzetta & Driscoli, 1966), the GSR data were discrepant with the subjects' self-reported pain ratings. One of the main difficulties with psychophysiological measures (e.g., GSR) is that subjects habituate relatively quickly to the kinds and intensity of stimuli which are used in experimental situations.

(3) Task Performance

Due to the problems in using psychophysiological measures to index perceived control, Glass and his colleagues (Glass, Reim, & Singer, 1971; Glass & Singer, 1972b) used other measures. Specifically, after receiving unpredictable noise, subjects were given a proof-reading task and an insolvable puzzle task. In general, results revealed that subjects who had actual control or who believed that they had control over the aversive stimuli performed better on the proof-reading task and demonstrated higher frustration tolerance on the puzzle task than those who had no control. Similarly, in many learned helplessness studies (e.g., Benson & Kennelly, 1976; Gatchel & Proctor, 1976; Hiroto & Seligman, 1975; Klein, Fencil-Morse, & Seligman, 1976), subjects who received inescapable noise or insolvable

discrimination problems performed poorly on subsequent anagram tasks.

Although the above studies have demonstrated some significant performance differences between experimental and control subjects on such tasks as anagrams and puzzles, there is no evidence that these tasks provide sensitive or valid measures of perceived control. In other words, there might be variables other than perceived control that affect subjects' performance on these tasks. In most stress and learned helplessness studies (e.g., Glass & Singer, 1972b; Hiroto & Seligman, 1975), some subjects experience failures on the training tasks. These failures were manipulated by the experimenter. Since many of the subjects in these studies were college students, and they had earlier participated in various other psychology experiments, it should be asked whether these subjects were aware that the training tasks were in fact unsolvable or uncontrollable. If they were aware of the unsolvability, would they also infer that subsequent tasks such as anagrams and puzzles were also unsolvable? In a laboratory-induced learned helplessness study conducted by Cole and Coyne (1977), half of the subjects realized that the noise induction was designed to be inescapable. Although these subjects demonstrated performance decrements on the subsequent cognitive tasks, they might

have learned that the experimenter had prevented them from succeeding, and thus they were simply not motivated to perform the tasks.

On the other hand, Coyne, Metalsky, and Lavelle (1980) argued that cognitive interference associated with anxiety is the source of the performance decrements found in helplessness studies. Failure experiences elicit a task-irrelevant, negative focus on self. These authors hypothesized that attentional redeployment in the form of an imagination exercise could eliminate the performance decrements that follow a helplessness or failure induction. Using a procedure similar to that of Hiroto and Seligman (1975), subjects in Coyne et al.'s experiment were given uncontrollable noise followed by solvable anagrams. However, prior to solving the anagrams, one group of subjects was instructed to engage in an attentional redeployment exercise with an implicit rationale that it would attenuate physiological activity and improve problem solving. The redeployment group showed no performance decrements on the subsequent anagram task when compared to another group who did not have this treatment. The studies of Cole et al. and Coyne et al. clearly demonstrated that there were some variables (e.g., low motivation, low self-esteem) irrelevant to perceived loss of control that were responsible for performance decrements.

(4) Expectancy of Success

Expectancy of success is one of the common measures of perceived control. Langer (1975) hypothesized that a person who has or perceives increased control on a task will indicate a higher expectancy of success on that task, and her results provided strong support for this hypothesis. Specifically, in Langer's studies, when the characteristics of skill tasks (competence, choice, familiarity, involvement) were introduced into chance tasks (e.g., lottery), subjects raised their expectancy for success. An expectancy of success which is inappropriately higher than the objective probability was labeled the illusion of control (Langer, 1975). To illustrate, Langer (Experiment 6) examined the effects of passive involvement on the illusion of control. In this experiment, subjects purchased lottery tickets costing \$1 each. Involvement was manipulated by encouraging half of the subjects to think about the lottery on three separate occasions, while not encouraging the remaining subjects to do so. Half of the subjects were assigned to the High Involvement condition, in which they received the three-digit lottery ticket over three days, that is, one digit on each day. In the Low Involvement condition, the three-digit lottery ticket was given on the day of purchase. Before the drawing, subjects were asked if they would like

to trade their original ticket for a ticket in another lottery in which the chances of winning were higher. As predicted, subjects in the High Involvement condition were less willing to trade than those in the Low Involvement condition. Correspondingly, the former group stated higher confidence of winning the lottery.

Similarly, Golin, Terrell, and Johnson (1977) investigated the relation between the illusion of control and depression. In line with Beck's (1967) viewpoint that depressed people perceive themselves as inadequate, these authors hypothesized that depressed subjects would show lower expectancies for success in a skill-simulated chance task. In this experiment, depressed and nondepressed students were assigned to either a player-control or croupier-control condition. All subjects were presented with a number of poker chips on a Las Vegas style dice game in which they were to place a bet on the "field". In the player-control condition, the subjects threw the dice while in the croupier-control condition, the experimenter threw the dice. Subjects indicated their expectancy for success prior to each dice throw; however, only the initial expectancy was studied. Depressed subjects were more confident of success in the croupier-control condition than in the player-control condition, while nondepressed subjects were more confident

in the player-control condition than in the croupier-control condition. The results were interpreted as showing an external (croupier) locus of illusory control for depressed subjects and an internal (player) locus of illusory control for nondepressed subjects. More importantly, these findings suggested that, unlike nondepressed subjects, depressed subjects did not show an illusion of control when actively involved in a chance task. That is, depressed subjects showed a more realistic dubiousness about their own competence in controlling the outcome of a chance task.

In an attempted replication, Golin, Terrell, Weiz, and Drost (1979) used the identical procedure but with clinically depressed and nondepressed patients. The results were similar in that the nondepressed subjects demonstrated greater expectancies of success in the player-control condition than in the croupier-control condition. However, unlike the previous findings, there was no significant difference between the expectancies of success in the player-control and croupier-control conditions among the depressed subjects. The authors failed to explain this discrepancy. Taken together, these studies suggest that depressed persons are less likely to develop an illusion of control, presumably as a result of their general sense of personal incompetence.

However, in explaining the results of Golin et al.'s (1977) study, Arnkoff and Mahoney (1979) suggested that the illusion of control for the nondepressed subjects supports Becker's (1973) position that people protect themselves from reality by maintaining an illusion of control over their destiny. On the other hand, Arnkoff and Mahoney suggested that "depressed subjects in the Golin et al. (1977) study were realistic regarding their own power or skill" (p. 167). Similarly, Alloy and Abramson (1979), in a study of perceived control in nondepressed and depressed college students, found that depressed individuals were relatively more accurate in assessing the lack of control, whereas nondepressed subjects believed they had control when they did not. Overall, the results of the above studies (Alloy & Abramson, 1979; Golin et al., 1977, 1979) suggest that depression affects expectancies, thus rendering assessments of perceived control even more complex. Therefore, expectancy for success may not be a good measure of perceived control when depression is present.

On the other hand, depression is not found to be related to expectancies for success in learned helplessness studies. In a study by Miller and Seligman (1976), depressed and nondepressed college students received escapable noise, inescapable noise, or no noise. Subjects then

indicated their expectancies for success on a skill or chance task. Results revealed no main effect of depression on the initial expectancy, suggesting that depression does not invariably lead to low expectancy. The other finding was that the expectancy for success decreased less following failure in a skill task for depressed and helpless subjects than for nondepressed and nonhelpless subjects. This small expectancy change was interpreted as the tendency of helpless subjects to perceive responding and outcome on a skill task as independent (cf. Abramson, Garber, Edwards, & Seligman, 1978; Klein & Seligman, 1976; Miller & Seligman, 1973; Miller, Seligman, & Kurlander, 1975). However, increasing evidence in attribution research (Rizley, 1978; Weiner, Frieze, Kuhla, Reed, Rest, & Rosenbaum, 1971; Weiner, Heckhausen, Meyer, & Cook, 1972) demonstrates that an attributional dimension of stability rather than locus of control is the primary determinant of expectancy change. Therefore, in their reformulated learned helplessness model, Abramson, Seligman, and Teasdale (1978) concluded that "... examination of expectancy changes on chance and skill tasks is not a direct way of testing helplessness, since such changes are sensitive to the attributional dimension of stability and not to expectations about response-outcome contingencies" (p. 64).

(5) Decision Latencies

In a series of paired-associate learning experiments, Perlmutter and his associates (Perlmutter & Monty, 1973, 1977; Perlmutter, Monty, & Cross, 1974; Perlmutter, Monty, & Kimble, 1971; Perlmutter, Scharff, Karsh, & Monty, 1980) found that subjects who had choice over selecting the words they would like to learn performed better on subsequent memory tasks than those who did not have such control. These authors attributed performance increments to the heightened motivation resulting from their perception of control. In line with this hypothesis, Revesman and Perlmutter (1981), as discussed previously, found that the Implicit Control group reached their decisions faster than the Explicit and No-control groups, suggesting that their motivation was heightened as a result of perceived control. Surprisingly, the paired-associate data (memory task) failed to demonstrate superior recall performance for the Implicit Control subjects.

On the other hand, Harvey and Jellison (1974), in a study on the relationship between perceived choice and decision time, found that subjects reported perceived choice to be greater when they received bogus information indicating that their decision time had been longer. Since the decision time in Revesman and Perlmutter's study was the sub-

jects' actual decision time, whereas in Harvey and Jellison's study, the decision time was based on bogus feedback to the subjects, a direct comparison of these two studies with respect to the relationship between the actual decision time and perceived control cannot be made. Nevertheless, the outcomes appear to be contradictory.

In sum, the various dependent measures of personal control do show some consistency (e.g., Glass & Singer, 1972a, 1972b; Harvey & Jellison, 1974; Langer, 1975); however, in a number of studies, the relationship appears discrepant, and furthermore, outcome consistency between paradigms is often not high (e.g., Bandler, Madaras, & Bem, 1968; Cole & Coyne, 1977; Coyne, Metalsky, & Lavelle, 1980). It seems that no one measure of perceived control validly measures this construct in all situations. Therefore, the present study will simultaneously utilize a variety of these measures so that a more reliable assessment can be made within a single paradigm.

Dependent Measures

There are five dependent measures in the present study, namely, decision latencies, expectancy for success, bet size, memory performance, and self-reports. According to the motivation model, an increase in the perception of con-

trol should enhance motivation which, in turn, should facilitate decision latencies. The generalized effects of perceived control should be reflected in a higher expectation for success in the dice game. Presumably, an increased perception of control would also be associated with larger bet size, and improved performance on the cued recall task. Finally, this increased perception of control would also be expressed on the self-report measures. However, the sequential nature of these measures limits their usefulness. That is, memory performance may have been affected by the perception of control on the decision-making trials as well as the outcomes of the dice game. Similarly, the self-report measures collected at the conclusion of the experiment may reflect the combined effects of all these experiences. Thus, the primary measures of the present study are the decision latencies and expectancy for success.

METHOD

Subjects

The subjects were 220 male and female introductory psychology students from Virginia Polytechnic Institute and State University. They received an additional credit toward their course grade for research participation. Data from 20 subjects were dropped for failure to follow instructions or for apparatus difficulties. As a result, there were 200 subjects in this experiment.

Apparatus

The stimuli consisted of words typed in elite capitals on Kodak Ektagraphic Write-On slides. These slides were projected with a Kodak 760H Carousel projector at a viewing distance of 1.8 m. The projector was programmed with two Hunter model 100C silenced decade interval timers so that slides were presented every 10 seconds. The decision times were measured by a Hunter Klockounter model 120 digital timer connected to an electronic voice key (Gerbrands Company, model 800) and a microphone.

The white noise was taped at 90 dB from a white noise generator (Lafayette Company, model 15011) and was presented on a Sanyo model 2535 tape recorder and a headphone.

Materials

Paired-associate choice task. The 48 words were taken from the first 55 words of a list generated by Locascio and Ley (1972) and were of relatively high meaningfulness. These words were assembled into 16 groups (two for practice and 14 for the experiment proper) of three items each, with one word in each group serving as the stimulus word and the remaining two words as the response words. Each five-letter word consisted of consonant/vowel/consonant/vowel/consonant. Words were projected onto a screen with the stimulus word centered on the left of the screen and the two response words listed one after the other on the right. Subjects were instructed to choose one response word to associate with the stimulus word and recite it quickly into the microphone. The dependent measure was the decision latencies of announcing the chosen response words.

Dice game. A miniature Las Vegas dice table was used. Subjects were given five poker chips and were asked to bet on the "field" of the dice table. The "field" indicated that dice throws of 3, 4, 9, 10, and 11 would win, dice

throws of 2 and 12 would win double, while all other throws would lose. There was one trial in this game and subjects could bet one to five poker chips on that trial. Prior to placing the bet, subjects indicated their expectancy for success on a scale ranging from 0 (least confident) to 10 (most confident) which constituted the dependent measure.

Cued recall task. The 14 stimulus words in the paired-associate choice task were presented in a random order with a space next to each stimulus word. Subjects were to recall the respective response words which they had chosen previously.

Attribution measures. These consisted of four separate 7-point scales asking the subjects to rate: (1) difficulties in paired-associate learning; (2) their ability for learning paired-associates; (3) their concentration on learning paired-associates; and (4) time constraints in choosing response words.

Sense of control measures. These consisted of two separate 7-point scales ranging from 1 (least control) to 7 (most control), which allowed subjects to rate their perception of control on the exposure duration of the paired-associate word sets as well as the whole experiment.

Mood measure. It consisted of a 7-point mood scale ranging from 1 (very unhappy) to 7 (very happy), which allowed subjects to rate their present mood.

Noise intensity scale. It consisted of a 7-point noise intensity scale ranging from 1 (low intensity) to 7 (high intensity), on which subjects rated the intensity of the noise they received.

Illusion of control measures. These consisted of two separate 7-point scales ranging from 1 (least control) to 7 (most control), which allowed subjects to rate their perception of control on the duration and loudness of the noise.

Locus of control scale (I-E). The scale was constructed by Rotter (1966). It consisted of 29 pairs of statements and was designed to measure individual differences in a generalized expectancy for internal-external control.

Desirability of control measure (DC). The measure was constructed by Burger and Cooper (1979). It consisted of 20 items and seven possible responses for each item. It was designed to measure individual differences in the general level of motivation to control the event in one's life.

Self-rating depression scale (SDS). The scale was constructed by Zung (1965). It consisted of 20 items and four possible responses for each item. It was devised to measure the severity of depression.

Design

The design was a factorial with two levels of condition (noise & no-noise) and five levels of treatment (100% Explicit-Control, 100% Implicit-Control, 50% Explicit-Control, 50% Implicit-Control, & No-Control).

Treatment

1. 100% explicit control group (100EC). These subjects were told prior to the decision trials that their verbalization of the chosen response words would cause the screen to go blank.

2. 100% implicit control group (100IC). These subjects' verbalization of the response words on the decision trials caused the screen to go blank; however, this information was not provided to the subjects.

3. 50% explicit control group (50EC). These subjects' verbalization of the response words caused the screen to go blank on one-half of the 14 decision trials. These seven control trials were randomly presented among the 14 decision trials with no more than two such trials occurring in succession. These subjects were informed prior to the decision trials that their verbalization of the response words would cause the screen to go blank "sometimes".

4. 50% implicit control group (50IC). These subjects' verbalization of the response words caused the screen to go blank on one-half of the 14 decision trials; however, this information was not provided to the subjects.

5. No-control group (NC). These subjects' verbalization of the response words did not cause the screen to go blank. No prior information was given concerning the effects of announcing the response.

Condition

1. Noise condition (N). Subjects received a continuous, uncontrollable white noise (90 dB) throughout the 14 decision trials through the headphones. The total duration of the noise was 140 sec.

2. No-noise condition (NN). Subjects did not receive the white noise during the 14 decision trials; however, they also wore the headphones.

Procedure

Subjects were randomly assigned by order of their appearance to one of the 10 groups of 20 subjects each. After being seated, a microphone was placed around the subject's neck so that it was between 5 and 7 cm from the subject's mouth. Instructions were read by the experimenter to

each subject. All subjects were told that the experiment involved memory and in particular the learning of associations between the respective stimulus and response words. A set of headphones was placed on the subject's head. Prior to the presentation of the actual paired-associate word sets, two practice trials were presented to insure that the subjects understood the paired-associate learning task.

Following the practice trials, subjects were presented with the actual decision trials. A new word set appeared every 10 seconds. The maximum exposure duration of each word set was 10 seconds, but it could be shortened following the subject's announcement of the chosen response word in the 100% Explicit-Control and 100% Implicit-Control groups. For the 50% Explicit-Control and 50% Implicit-Control groups, the subject's announcement of the response words caused the screen to go blank in seven predetermined trials but not on others. For the No-Control subjects, their announcement of the response words had no effect on the exposure duration of the words on the screen. Subjects in the noise condition received a continuous, uncontrollable noise (90 dB) throughout the 14 decision trials through the headphones, whereas those in the no-noise condition did not receive this noise. However, these subjects also wore headphones. Subjects were asked to recite the chosen response

word aloud into the microphone and their decision latency for each trial was recorded.

Upon completion of the decision trials, subjects were directed to a miniature Las Vegas type dice table. They were asked to bet on the "field" with the poker chips provided. There was only one trial in this dice game. Before placing their bet, subjects were given an expectancy scale with which they were to indicate their expectancy for success on that trial. Then they were asked to throw the dice.

When they finished the dice game, subjects were administered the cued recall task. Following it, they received the attribution measures, sense of control measures, mood measure, I-E, DC, and SDS scales. In addition, subjects in the noise condition were administered the noise intensity scale and illusion of control measures. Finally, subjects were fully debriefed.

RESULTS

Decision time

Analysis of variance (ANOVA) on decision times across trials revealed a significant main effect for group, $F(4, 173)=14.75$, $p<.001$, $MS = 204388.2$, as well as a main effect for decision trials, $F(13, 2249)=15.79$, $p<.001$, $MS = 11039.9$, and a Group X Trial interaction, $F(52, 2249)=2.55$, $p<.001$, $MS = 1785.8$. However, there were no significant effects for condition (noise and no-noise) or Group X Condition interactions. The means and standard deviations of decision times for various groups are shown in Table 1. A Duncan's test on the mean decision times in all conditions revealed that the No-Control subjects responded significantly slower than all other groups, suggesting that environmental control, be it partial or complete, activated subjects' motivation. Furthermore, the 100% Implicit-Control subjects were found to respond significantly faster than all other groups, suggesting that complete and implicit control induced the highest motivation in subjects.

To test further the effects of control on decision times, an ANOVA was performed on control and no-control

Table 1
Mean and Standard Deviation of Decision Times

Group	Mean	SD
No-Noise Condition		
100% Explicit-Control	3.486	.973
100% Implicit-Control	3.587	1.210
50% Explicit-Control	4.025	.923
50% Implicit-Control	3.703	.829
No-Control	5.024	1.422
Noise Condition		
100% Explicit-Control	3.551	.891
100% Implicit-Control	2.919	.697
50% Explicit-Control	3.850	.929
50% Implicit-Control	3.743	.726
No-Control	4.567	1.266

Note. Maximum decision time = 10.00 sec.

trials in 50% Explicit Control and 50% Implicit-Control groups. The decision trials were classified into two categories, namely those trials following control (7 trials) and those trials following no-control (6 trials). There was a significant main effect for control, $F(1, 78)=27.31$, $p<.001$, $MS = 3134.8$. That is, subjects responded significantly faster on trials following control ($\bar{X}=3.73$ sec) than on trials following no-control ($\bar{X}=4.01$ sec). However, no other significant effects were found. Separate one-way ANOVAs were done on the 100% and 50% control groups with respect to the effects of explicitness of control on decision times. No significant effects were found. Finally, there were no interactive effects of explicitness and degree of control on decision times.

Relationship between decision times and other measures of perceived control

A correlational analysis was done for all subjects on the mean decision times, expectancy for success, bet size, memory performance, and the self-report measures. Results revealed that the decision times were positively related to the self-reports of perceived control over exposure durations of the decision materials, $r=.20$, $p<.005$, as well as to the report of control in the overall experiment, $r=.15$, $p<.05$, (see Table 2). Although significant, these correla-

Table 2

Pearson Correlations Between Decision Times,
Behavioral Measures, and Self-reports
of Perceived Control

Decision Times	Expec- tancy	Bet Size	Memory	Control: Exposure Durations	Control: Overall
Decision Times	-.01	-.12	.02	.20**	.15*
Expectancy		.34***	.14*	.11	.21
Bet Size			.03	.05	.07
Memory				.23**	.35***
Control: Exposure Durations					.70***
Control: Overall					

* $p < .05$.

** $p < .005$.

*** $p < .0001$.

tions were quite low. Further analysis revealed that these significant positive correlations were only found in the 100% control condition. That is, the correlation coefficients between the decision times and perceived control over the exposure durations of the materials as well as perceived control in the experiment were .39 and .28, respectively. These results suggested that the longer the decision times, the greater the self-reports of perceived control in the 100% control condition. However, these findings are contradictory to the prediction of the motivation model that high motivation (i.e., short decision times) is associated with perceived control. The expectancy for success on the dice game was positively related to the bet size, $\underline{r}=.34$, $p<.0001$, as well as to memory performance, $\underline{r}=.14$, $p<.05$, and perceived control in the overall experiment, $\underline{r}=.21$, $p<.005$. Similarly, memory performance was positively related to perception of control over the exposure durations of the decision materials, $\underline{r}=.23$, $p<.005$, and perception of control in the overall experiment, $\underline{r}=.35$, $p<.0001$. Finally, both self-reports of perceived control were highly correlated, $\underline{r}=.70$, $p<.0001$ (see Table 2).

Expectancy, bet size, and memory performance

Separate ANOVAs were performed to evaluate the effects of degree of control, noise/no noise, and the implicit/explicit variables. These variables had no significant effects upon expectancy, bet size, and memory performance.

To assess the effects of control on memory performance more closely, the specific response words which were selected on control and no-control trials in 50% control groups were examined. A within-subjects ANOVA was done using explicitness (explicit vs. implicit) and control (control vs. no-control) as independent variables. There was a significant main effect of control on memory performance, $F(1, 159)=60.02$, $p<.0001$, $MS =60.03$. That is, subjects recalled more items selected on no-control trials ($\bar{X}=3.51$) than those selected on control trials ($\bar{X}=2.29$). On the other hand, there were no significant effects of explicitness or Control X Explicitness interaction. Finally, although the explicit control subjects appeared to recall fewer words ($\bar{X}=2.68$) than the implicit control subjects ($\bar{X}=3.13$), this effect was not significant.

Self-reports of perceived control

Subjects' self-reports of perceived control were obtained with the post-experimental questions on which subjects were to rate their perceived control over the exposure durations of the decision materials and in the overall experiment. Separate ANOVAs were performed on these questions using group (100% Explicit-Control, 100% Implicit-Control, 50% Explicit-Control, 50% Implicit-Control, & No-Control) and condition (noise vs. no-noise) as the independent variables. There were no significant effects of either condition or Group X Condition interaction on these questions. However, there was a significant main effect of group on the exposure durations, $F(4, 190)=7.39$, $p<.001$, $MS = 19.12$, and the overall experiment, $F(4, 190)=3.10$, $p<.05$, $MS = 6.39$. Duncan's tests on the mean scores of these two questions revealed no significant differences among the 100% Explicit-Control, 100% Implicit-Control, and No-Control groups as well as no differences between the 50% Explicit-Control and 50% Implicit-Control groups. However, the former three groups indicated significantly greater perceived control than the latter two groups over the exposure durations of the decision materials and in the overall experiment (see Table 3). That is, the 50% control condition resulted in lower perceived control over the exposure durations and in the overall experiment.

Table 3

Group Means on Self-reports of Perceived Control
Over the Exposure Durations and in
Overall Experiment

Group	N	Control: Exposure Durations	Control: Overall
100EC	40	3.98	3.68
100IC	40	3.43	3.53
50EC	40	2.43	2.80
50IC	40	2.45	2.95
NC	40	3.53	3.58

Note. Maximum score = 7.00.

Attributions and mood

Analyses of variance revealed no significant effects of group, condition, or Group X Condition interaction on subjects' attributions regarding the choice task and their present mood.

Perceived intensity of noise

Subjects in the noise condition were asked to rate the intensity of noise they received during the decision trials. Analysis of variance revealed no significant effects of groups.

Self-reports of illusory control

Subjects' self-reports of illusory control were obtained by asking subjects in the noise condition to rate their perceived control over the duration as well as the intensity of noise. Analysis of variance revealed no significant main effects of group on either measure. On the other hand, there were significant positive correlations between self-reports of illusory control and self-reports of perceived control, $r=.49$, $p<.001$, as well as illusory control and the expectancy for success, $r=.23$, $p<.05$. The results suggested that perception of control over the noise was correlated with the overall sense of control as well as with the expectancy for success on the dice game.

Individual differences in perceived control

To investigate the effects of individual differences on the perception of control, subjects were categorized into different groups according to their scores on the individual difference inventories. Subjects scoring 10 and above on Rotter's (1966) I-E scale were classified as externals, whereas those scoring 9 and below were classified as internals. On Burger and Cooper's (1979) Desirability-of-Control scale, scores of 101 and above were classified as high desire for control, while scores of 100 and below were classified as low desire for control. Finally, subjects scoring 33 and above on Zung's (1965) Self-rating Depression Scale were classified as depressed, while those scoring 32 and below were classified as nondepressed.

In each of the two control conditions (100% & 50%), three separate ANOVAs were performed. The no-control condition was excluded because the explicit vs. implicit variable was not involved in this condition. Since previous data showed no significant effect for noise, subjects in the noise and no-noise conditions were grouped together in these analyses. The independent variables of each ANOVA included the explicitness of control (explicit vs. implicit) and one of the three individual difference variables (internal vs. external, depressed vs. nondepressed, high vs. low desire

for control). The dependent measures were the decision times, expectancy, bet size, memory performance, and self-reports of perceived control.

In the 100% control condition there was a significant main effects of desire for control (DC) on memory performance, $F(1, 76)=10.16$, $p<.005$, $MS = 7.43$. Within the 100% control condition, the high DC subjects recalled significantly more words ($\bar{X}=6.75$) than the low DC subjects ($\bar{X}=4.90$). In addition, a significant Explicitness X I-E interaction was found on the expectancy for success, $F(1, 76)=4.81$, $p<.05$, $MS = 13.18$. However, none of the main effects were significant. No other significant effects were found when depression was used as an independent variable.

In the 50% control condition, there was a significant Explicitness x DC interaction on expectancy for success. $F(1, 76)=14.33$, $p<.001$, $MS=39.46$. All the main effects were significant. That is, within the explicit control condition, the high DC subjects indicated a greater expectancy ($\bar{X}=6.13$) than the low DC subjects ($\bar{X}=4.29$). On the other hand, within the implicit control condition, the low DC subjects indicated a greater expectancy ($\bar{X}=5.65$) than the high DC subjects ($\bar{X}=4.64$). Similarly, the high DC subjects indicated a greater expectancy in the explicit control condition than in the implicit control condition, while the low DC

subjects indicated a greater expectancy in the implicit control condition than in the explicit control condition. These results suggest that subjects with high desire for control valued control more when they received some information regarding control, while subjects with low desire for control valued control more when they received no information regarding control.

In summary, the results revealed relatively few significant effects of treatments on decision times and other measures of perceived control. Although the control subjects demonstrated faster decision times than the no-control subjects, there is no evidence that the perception of control differed in these conditions. These data suggest that predictions of the motivation model may not apply in the control situation. That is, although the subjects' motivation as measured by decision latencies was heightened as a result of control over the environment, such heightened motivation failed to generalize to the dice game. The failure to find a generalized effect of environmental control is discrepant with the perceived control motivational hypothesis. It will be recalled that a correlational analysis had indicated a positive rather than a negative relationship between decision times and self-report of perceived control. That is, opposite to our prediction, longer decision times

were generally associated with greater perceptions of control. Similar results have been found in Harvey and Johnston's (1973) study in which subjects were provided with bogus feedback regarding their decision latencies. Taken together, these results seem to suggest that in the present experiment, decision times may provide feedback to the subjects and thereby affect their perception of control. Thus, longer decision times lead to a stronger perception of control than do relatively faster decision times.

Post-hoc analysis

In order to investigate further the hypothesis that perceived control is partially determined by feedback from the subjects' responses, a series of post-hoc multiple regression analyses were conducted. Separate regression analyses were performed on the various groups in the noise and no-noise conditions. Specifically, subjects' decision times were treated as a continuous, independent variable, and the explicitness of control (explicit vs. implicit) was treated as a categorical, independent variable. The dependent measures were the expectancy, bet size, and memory performance as well as the self-reports of perceived control. Since very few significant results were found in the no-noise condition, only the results in the noise condition are reported here.

100% control condition

Regression analyses revealed that subjects' decision times, irrespective of explicitness on the choice task, was a significant predictor for the expectancy for success in the dice game, $R^2=.22$, $p<.01$. Specifically, there was a significant curvilinear relationship between decision times and expectancy in that subjects with very short and very long decision times indicated lower expectancy than those with medium decision times. On the other hand, there was a significant negative relationship between decision times and bet size, $R^2=.22$, $p<.005$. That is, the longer the decision time, the smaller the size of the bet.

Although the interaction of explicitness and decision times was not found on the expectancy and bet size, the interaction was found with the memory performance, $F(1, 36)=6.86$, $p<.05$, $MS = 4.68$. When the decision time increased, the memory performance of the implicit control subjects was unaffected whereas performance for the explicit control subjects deteriorated (see Figure 1). Similarly, there was a significant interaction of Explicitness X Decision Time on the self-report of perceived control over the exposure durations of the decision materials, $F(1, 36)=4.71$, $p<.05$ (see Figure 2). An interaction was also found on the self-report of perceived control in the overall experiment,

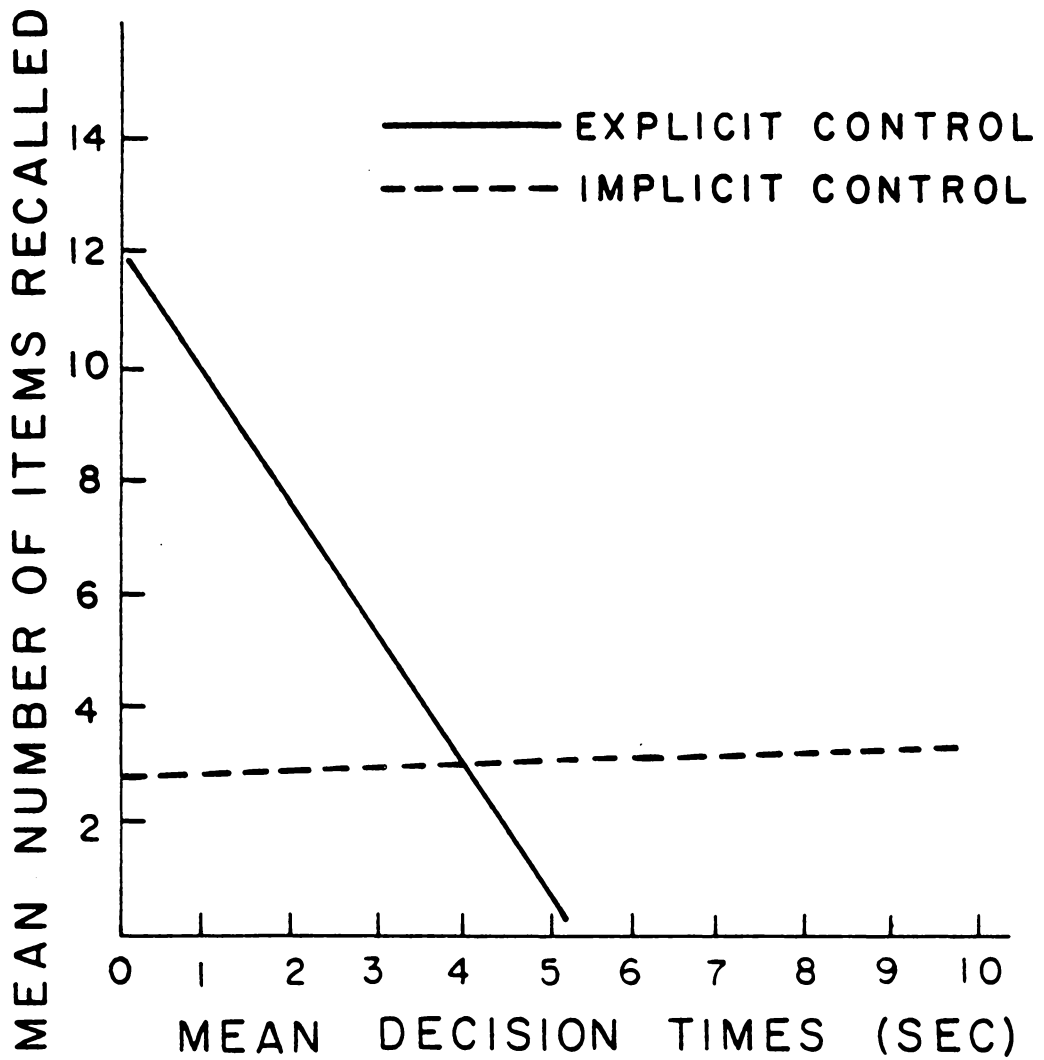


Figure 1. Relationship between mean recall and mean decision times for 100% explicit control and 100% implicit control groups in noise condition

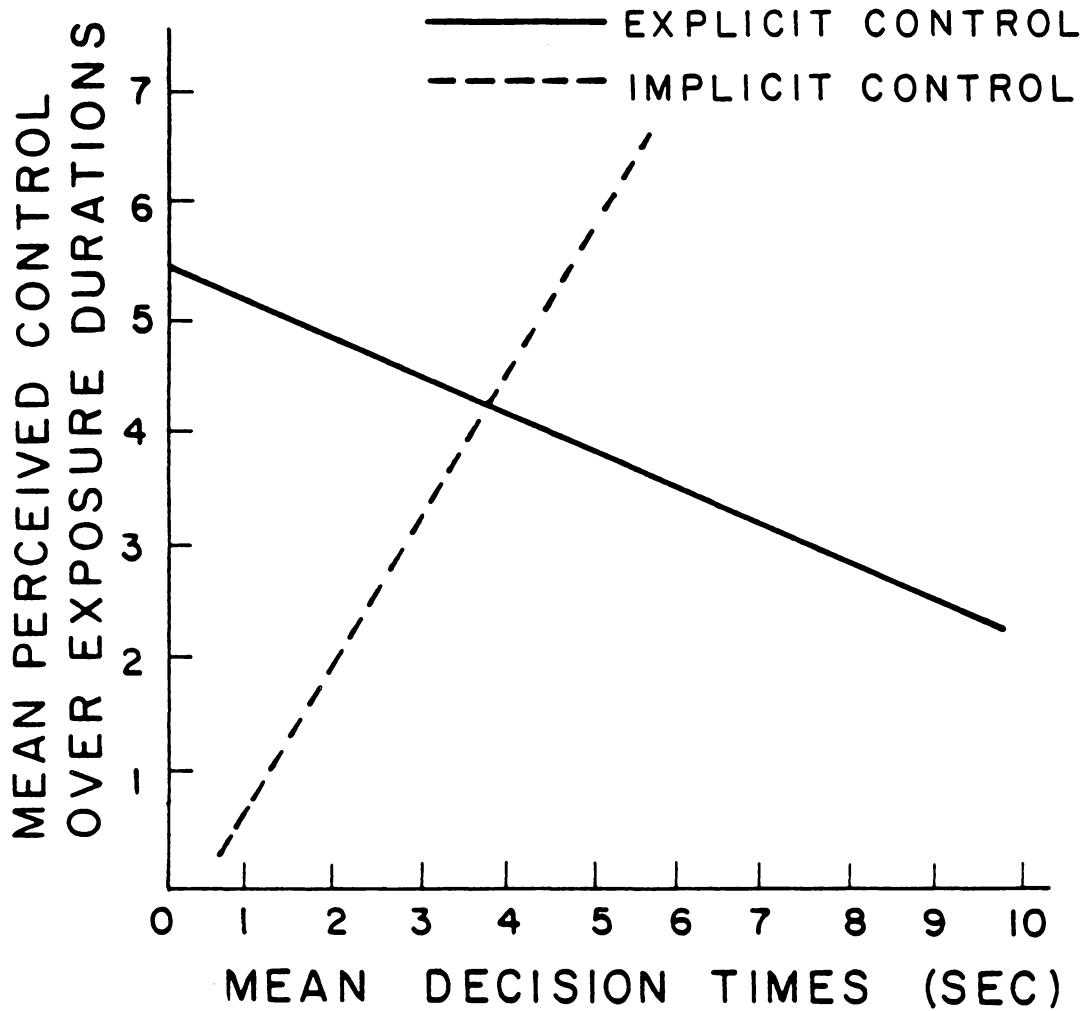


Figure 2. Relationship between mean perceived control over exposure durations and mean decision times for 100% explicit control and 100% implicit control groups in noise condition

$F(1,36)=3.80$, $p<.06$. However, the interaction was marginally significant. The implicit control subjects reported greater perceived control as their decision times increased, whereas the explicit control subjects reported less perceived control as their decision times increased. These findings suggest that the relationship between decision times and perception of control is different for the explicit control and implicit control subjects. It seems that the perception of control develops as a result of both the subject's behavior (decision latencies) as well as the information provided to the subject about the opportunities for control. It is likely that these elements jointly determine the degree to which perceived control will become strengthened by the experience of control.

50% control condition

Unlike the curvilinear relationship found between the decision times and the expectancy in the 100% control condition, the decision times in the 50% control condition were negatively related to the expectancy, $R^2=.19$, $p<.005$. That is, the longer the decision times, the lower the expectancy for success on the dice game. On the other hand, there was a significant interaction of Explicitness of Control X Decision Times on bet size, $F(1, 36)=5.47$, $p<.05$. The implicit

control subjects with longer decision times bet more than those with shorter decision times whereas the explicit control subjects with shorter decision times bet more than those with longer decision times (see Figure 3). These results are similar to the self-reports of perceived control in the 100% control condition. Briefly, the results suggest that the implicit control subjects perceived more control as their decision times increased and thus bet size increased, whereas the explicit control subjects perceived less control as their decision times increased and bet size decreased correspondingly.

No-control condition

No significant effect was found when decision times were used as a predictor variable for perceived control in the no-control condition. This finding lends face validity to the relationship between decision time and the perception of control in that decision time is related to the perception of control only when control is available.

The intimate relationship between decision times and perceived control, as revealed in the regression analyses, suggests that subjects might vary their decision times to explore control over the blanking of the screen. To explore this possibility, separate regression analyses were per-

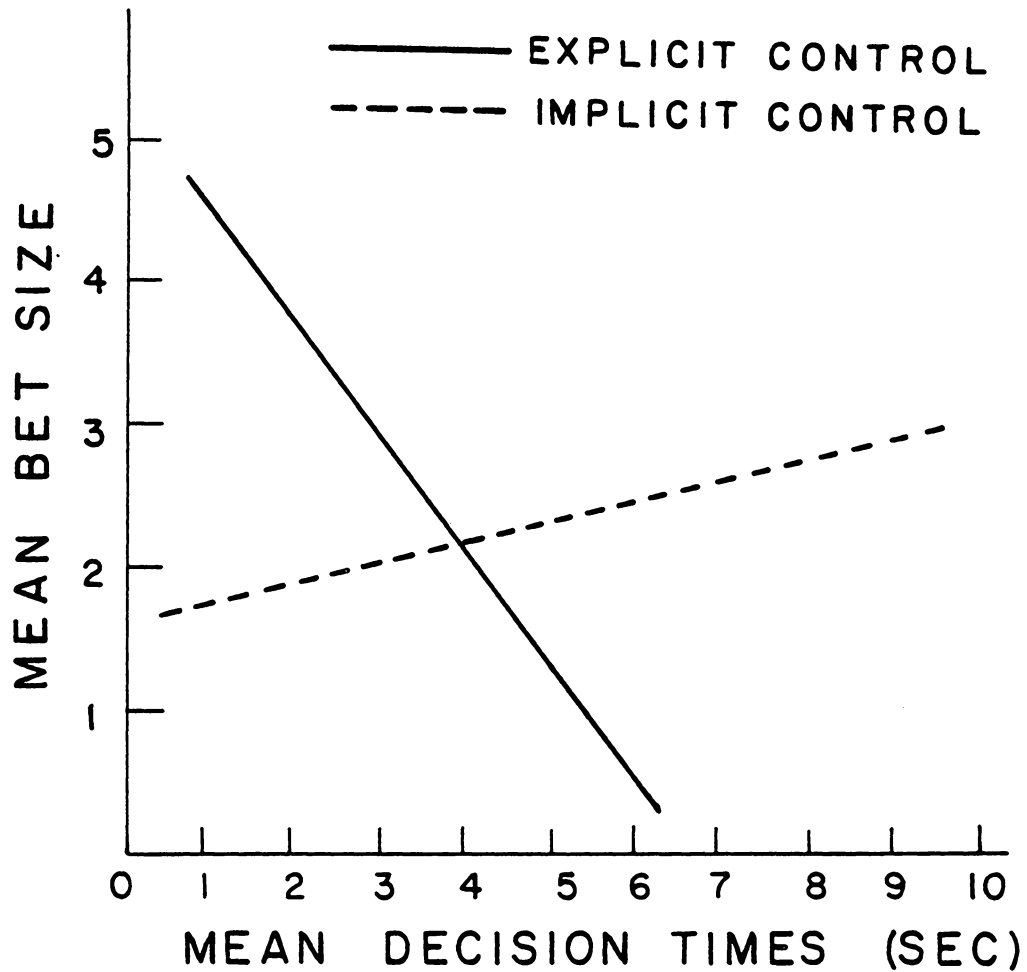


Figure 3. Relationship between mean bet size and mean decision times for 50% explicit control and 50% implicit control groups in noise condition

formed in the different conditions (100%, 50%, & no-control). Specifically, the variance of decision times was used as a continuous, independent variable, and the explicitness of control (explicit vs. implicit) was treated as a categorical independent variable. The dependent measures were expectancy, bet size, memory performance, and self-reports of perceived control. Because the variance of decision times was highly correlated with the mean decision time, $r=.74$, $p<.0001$, the effects of mean decision time on variance were partialled out using a partial correlation technique so that the effects of variance, if any, would be independent of decision times. Hence, the residual variances were used in the analyses to be described. Similar to the decision time data, few significant results were found in the no-noise condition, and only the results in the noise condition are reported here.

100% control condition

There were no significant effects of residual variance, explicitness, or the Variance X Explicitness interaction on expectancy, bet size, and memory performance. However, significant Variance X Explicitness interactions were found on the self-reports of perceived control over the exposure durations of the decision materials, $F(2, 34)=7.13$, $p<.05$,

and in the overall experiment, $F(2, 34)=7.34$, $p<.05$. Both the implicit control and explicit control subjects indicated greater perceived control as the residual variances increased. However, the implicit control subjects indicated greater perceived control at a lower level of residual variance than the explicit control subjects (see Figures 4 & 5). It is not surprising that the level of variance was higher in the explicit condition, since they had foreknowledge regarding the relationship of response announcements and the blanking of the screen. These results seem to suggest that higher variances are associated with greater perceived control.

50% control condition

There was a significant main effect of variance on self-reports of perceived control. Specifically, there was a significant quadratic relationship between residual variance and self-reports of perceived control over the exposure durations of the decision materials, $R^2 = .15$, $p<.05$. That is, both the explicit control and implicit control subjects indicated greater perceived control as the residual variance increased.

No-control condition. Since all the no-control subjects were in the implicit control condition, the effects of

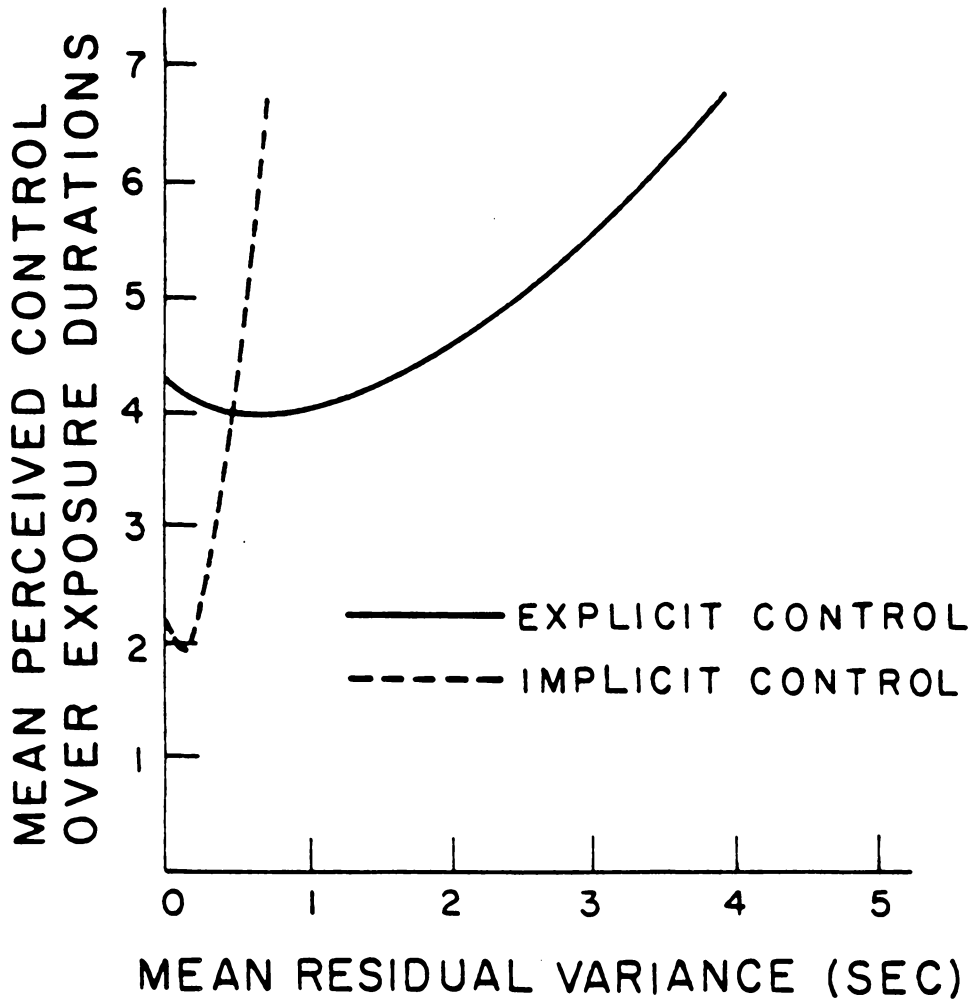


Figure 4. Relationship between mean perceived control over exposure durations and mean residual variance for 100% explicit control and 100% implicit control in noise condition

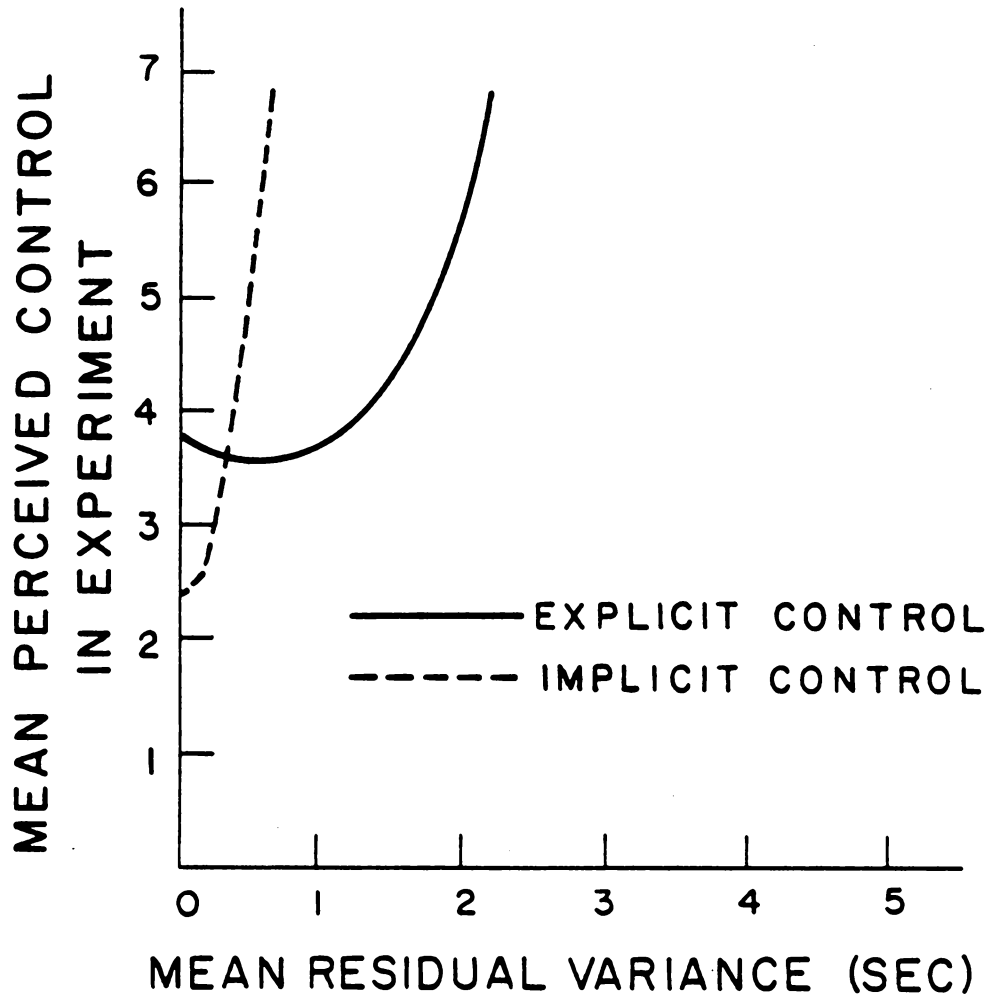


Figure 5. Relationship between mean perceived control in experiment and mean residual variance for 100% explicit control and 100% implicit control groups in noise condition

the explicitness of control (explicit vs. implicit) could not be evaluated. Thus, the residual variance of decision times was used as the single independent variable for perceived control and a regression analysis was performed. Results revealed no significant prediction values at all when the residual variance was used as the independent variable. The failure to observe a relationship between residual variance and perceived control in this condition lends further support to the observation that decision times varied according to the exploration of control, but this occurred only when control was available.

DISCUSSION

Decision Times, Motivation, and Perceived Control

As expected, faster decision times were observed when the announcement eliminated the materials from the screen. Furthermore, faster decision times were observed not only in situations in which the removal of materials was always contingent upon subjects' announcement of decisions, but also in situations in which the removal of materials was occasionally contingent upon subjects' announcements of decisions. These results replicated those found by Revesman and Perlmutter (1981) and appear to provide support for Perlmutter and Monty's (1977) motivation model. That is, motivation is enhanced as a result of the perception of control. However, unlike some previous findings showing a generalized state of motivation, the present study indicated that elevated motivation is specific rather than general (cf. Monty, Rosenberger, & Perlmutter, 1973; Perlmutter, Scharff, Karsh, & Monty, 1980). In the 50% control condition, subjects responded significantly faster on trials following the experience of control than they did on trials following the experience of no-control, suggesting that subjects' motivation as

expressed by their decision times varied according to the more immediate experience of control and no-control. These results are similar to those reported by Revesman and Perlmutter. Decision times were abruptly increased once control was removed. Furthermore, although the control subjects demonstrated faster decision times than the no-control subjects, there was no evidence that the control subjects perceived greater control than the no-control subjects.

Thus, these findings suggest re-examination of the relationship among perceived control, motivation, and decision times. According to Perlmutter and Monty's motivation model, subjects' motivation would be enhanced as a result of the perception of control, and thereby decision times would be shortened. That is, greater perceived control should result in faster decision times in the control condition. Despite the faster decisions in the control condition, an examination of self-report data showed a positive correlation between decision times and perceived control in the control condition. That is, the longer the decision times, the greater the perceived control. A similar finding was also obtained in Harvey et al.'s studies (Harvey & Jellison, 1974; Harvey & Johnston, 1973).

Taken together, these results cast doubt on the applicability of the motivation model, as derived from studies of

choice and perceived control. The present study suggests that heightened motivation (i.e., fast decision times) is a result of the opportunity to control rather than a result of the perception of control. Furthermore, this heightened motivation does not necessarily lead to better memory performance or generalize to another unrelated task such as a dice game.

In order to seek alternative hypotheses, a series of post-hoc regression analyses were performed in various control conditions. In the noise condition, the implicit control subjects reported greater perceived control over the exposure durations of the materials as well as in the overall experiment as their decision times increased. On the contrary, the explicit control subjects reported less perceived control over the exposure durations of the materials and in the overall experiment as their decision times increased. Apparently, when announced decisions cause the screen to grow blank, this contingency contributes to faster decision latencies but also results in a lowered perception of control. When subjects in the implicit condition slow down their decision latencies, they have a greater opportunity to exercise control and thus their perception of control increases. On the other hand, when subjects are informed, prior to the start of the experiment, that control

was available, the perception of control increases when subjects tend to exercise this relationship with use of faster responses.

Interestingly, as the decision times increased, memory performance remained unchanged for the implicit control subjects but deteriorated for the explicit control subjects. This result indicates that the exposure durations of the materials to be learned is less important in effecting learning than are the conditions which produce different exposures. Additional, albeit indirect, support for the relationship between decision times and perceived control came from an analysis among the no-control subjects. Since the no-control subjects had no control, decision times should not index the strength of perceived control. The results supported this hypothesis in that no significant relationship between decision times and perceived control was found in the no-control subjects.

Another interesting finding on the relationship between decision times and perceived control came from an examination of the variances of decision times. The regression analyses revealed that higher variances are associated greater perceived control for both the explicit control and implicit control subjects. These results suggest that subjects explore environmental control by varying their deci-

sion times. Similar to the decision latency data, no significant relationship was found in the no-control subjects between decision-time variances and perceived control.

Interestingly, although both the explicit control and implicit control subjects perceived greater control as their decision-time variances increased, within each of these conditions, the range of variances were different. The implicit control subjects indicated greater perceived control within a lower level of variance than the explicit control subjects. It is likely that the implicit control subjects sampled from a more narrow range since they were constrained by lack of information regarding the relation between control and the duration of the materials. The explicit control subjects were assured (via the instructions) that control resided with them despite the speed of their decisions.

One somewhat puzzling finding is that the effects of environmental control (blanking of the screen) seemed to be greater in the presence of a moderately aversive noise. One of the possible reasons is that the noise serves to provoke some tension in the subjects, and as a result, their general level of motivation was elevated. This high motivation served as a catalyst for exploration and exercise of control over the environment. Thus, the effects of control and no-

control were amplified. This explanation will have to await further testing.

In sum, the results of the present study fail to support the motivation model proposed by Perlmutter and Monty (1977). It was found that motivation was heightened as a result of the opportunity to control, and this opportunity did not enhance the perception of control. Furthermore, this heightened motivation failed to improve performance or generalize to the dice game. Generally, these results suggest that environmental control results in faster decision latencies but that this occurs at the cost of perceived control.

Complete Control versus Partial Control

The prediction that in the implicit condition the 50% control subjects would perceive greater control than the 100% control subjects received no support. The rationale for the prediction was based on the presumed salience of control vs. no-control. That is, the experience of no-control would make the experience of control more salient and thereby the perception of control would be greater. Opposite to what was expected, the 50% control subjects in both the explicit and implicit conditions reported less control over the exposure durations of the materials and in the

overall experiment than the 100% control subjects. These results seem to suggest that the 50% control subjects were frustrated by the unpredictable experience of control and thus they perceived less control. However, additional evidence besides self-report has to be sought to confirm this argument.

Environmental Control and the Perception of Control

The results of the present study suggest that environmental control (i.e., blanking of the screen) does not necessarily enhance the perception of control. In fact, a recent study by Perlmutter and Chan (in press) showed that the blanking of the screen in the decision-making portion of a paired associate choice task diminished rather than enhanced the perception of control. In their study, there were three conditions: early control, late control, and random control. Similar to the present study, subjects in Perlmutter and Chan's study were allowed to choose the response words they wanted to learn on a paired-associate task. None of the subjects were informed about the contingency between their spoken decisions and the blanking of the screen. When subjects announced their decisions, the screen on which the materials were presented went blank on the first seven of the 14 trials in the early control condition

but on the last seven trials in the late control condition. In the random control condition the seven control trials were intermixed with the seven no-control trials. If the environmental control (blanking of the screen) enhanced the perception of control, one would expect that the late control subjects would perceive the greatest control when compared to other subjects because they gained their control toward the end of the task. Similarly, one would expect that the early control subjects would be frustrated by losing their control at the end of the task, and thereby their perceived control would be the least. However, the results indicated that the early control subjects perceived the greatest control as reflected in the self-report measure. In addition, the effects of perceived control were found to generalize to a chance task (dice game) which was presented following the decision making trials. Specifically, the early control subjects indicated a significantly higher expectancy for success on the dice game than the other subjects. These results clearly demonstrated that the removal rather than the introduction of environmental control enhanced the perception of control. Perlmutter and Chan (in press) proposed that the early control subjects developed more perceived control on the final trials after experiencing the constraints of environmental control. On the other

hand, the late control subjects presumably felt that they were losing their opportunity for control on the later trials and thus they perceived relatively less control. Further, the random control subjects reported the least amount of control owing to the low predictability of control trials. These findings seem to suggest that blanking of the screen serves as a constraint or control by the environment. Thus, it can be understood how control over the environment can result in a diminished perception of control.

Individual Differences and Perceived Control

Few significant results pertaining to individual differences were found. However, in both 100% explicit and implicit control conditions, the high DC (desire for control) subjects recalled more response words than the low DC subjects. This finding seems to contradict the prediction that the high DC subjects would perform worse than the low DC subjects because the former subjects might concentrate more on controlling the situation than on learning the materials. On the other hand, it could also be explained that the high DC subjects perceived greater control than the low DC subjects, and thus they performed better on the memory task. However, there is no direct evidence in this study to support this explanation.

Nevertheless, the results in the 50% control condition demonstrate some relationships between desire for control and perception of control. Within the explicit control condition, the high DC subjects showed a higher expectancy for success in the dice game than did the low DC subjects. On the other hand, within the implicit control condition, the high DC subjects showed a lower expectancy than did the low DC subjects. These results suggest that in the partial control condition, when they were told that they had some control over the blanking of the screen, the high DC subjects actively pursued and thus perceived greater control than the low DC subjects. When the information was not explicit, the high DC subjects might be more frustrated by the experience of partial control than were the low DC subjects.

On the other hand, there were no significant relationships between internality or depression and perceived control, which suggest that these individual difference variables might not be related to the perception of control.

CONCLUSION

The effects of choice and environmental control were examined in order to test a motivation model developed from Perlmutter and Monty's (1977) research on choice behavior. Apparently, choice has effects which are different from those of control. Under specifiable conditions, choice results in an increased perception of control and an increase in motivation. Although environmental control (i.e., blanking of the screen) results in faster decision times, such control over the environment does not necessarily enhance the perception of control. A series of post-hoc analyses suggested that fast decision times per se are not a good indication of heightened motivation. Rather, these post-hoc analyses seem to suggest that subjects' decisions are produced with latencies of different lengths and with different amount of variability in order to plumb the opportunity for control. That is, increased variability was correlated with the self-report of increased control.

The present study has provided some contributions to the understanding of the effects of choice and environmental control on the perception of control. Although environmen-

tal control (blanking of the screen) is motivating and results in faster decision times, it does not necessarily enhance the perception of control. On the contrary, environmental control may diminish the perception of control. The specific conditions in which environmental control enhances or diminishes the perception of control are many. Among these are subjects' knowledge about environmental control and their motivation to exercise control.

When environmental control is available explicitly, subjects who are motivated by this opportunity respond quickly, whereas those who are not motivated by this opportunity respond slowly. Presumably, subjects with fast decision times perceive greater control than those with slow decision times since the former subjects utilize the information about control in order to exercise control. On the other hand, when information regarding environmental control has not been provided explicitly, fast decision times are not associated with an increase in the perception of control. That is, in the implicit condition, subjects who exhibit fast decision times may have surmised incorrectly that they had to reach decisions quickly to prevent choice from being lost. Subjects who exhibit longer decision times have a better opportunity to explore and exercise control. In contrast to those in the explicit condition, subjects in

the implicit condition perceive greater control as the decision latencies increase. Regardless of whether they have received information about environmental control, subjects in both the explicit and implicit conditions appear to explore the opportunity for control by varying decision times. The greater the variability in decision times, the greater the perception of control. Thus, the perception of control is partially dependent upon subjects' motivation or desire for control and partially dependent upon the conditions under which control can be expressed.

However, the individual difference factors used in this study failed to identify subjects who have a high desire vs. those who have a low desire for (environmental) control. Furthermore, the effects of perceived control are more salient when a moderately aversive noise is present. Presumably, the noise provokes some tension in subjects and as a result, the motivation to explore and exercise environmental control is enhanced.

The possible applications of environmental control are many. For example, the mass production of assorted video games indicates that they are in high demand. These video games (e.g., sports, war) often attempt to simulate the real world as much as possible. One major and common characteristic of these video games is that player's responses have

an immediate effect on the environment as represented on the screen. Presumably, such environmental control is motivating and may even increase the perception of control. An increase in the perception of control may also improve affect. Although video games have been commonly used for visual-motor coordination training (e.g., pilot, driver), however, they have not been commonly used as a portion of psychological treatments. It may be fruitful to investigate the potential therapeutic functions of these video games. For example, phobias may be best treated by video games which simulate the phobic situations and permit immediate consequences which are contingent upon the patient's responses. Besides video games, environmental control is being used to motivate participation in physical exercises. For example, in one special kind of stationary bicycle, the participant's speed of pedaling determines the rate of change in scenes displayed on a video screen. It was found that faster responses and more sustained activities resulted when using this particular stationary bicycle. Other applications include television which does not operate unless the viewers (usually children) pedal a stationary bicycle. All of these examples illustrate the great potential which environmental control has for altering a variety of behaviors.

The successful applications of environmental control in video games and sport equipments may shed some light on the understanding of the failure of many behavior modification programs (e.g., smoking, drinking, obesity, energy conservation, seat belt wearing). One of the common problems in these programs is that they do not usually provide immediate feedback (environmental control) to the clients following the implementation of the targeted behaviors. For example, smokers do not usually know how well they are doing in the program until the therapist provides feedback, often after a week or even longer. Similarly, drivers may be ambivalent about wearing seat belts because they do not perceive any immediate consequence, positive or negative, of wearing the belts. Thus, future clinical research has to investigate the therapeutic functions of environmental control and its significance in psychological treatments. The results of the present study provide some important information about the development of perceived control and its interdependence on control.

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Appendix A

Word Sets Employed in the Experiment

Practice Sets

TULIP	WIDOW	NOMAD	POKER
	PAPER		WATER

Experimental Sets

MONEY	HABIT	ROBIN	SALAD
	LILAC		TOPIC
VAPOR	PUPIL	JEWEL	SINUS
	WOMAN		DOZEN
MANOR	COMIC	MEDAL	DEMON
	PECAN		LIMIT
FEVER	SATIN	TENOR	PANEL
	DECOY		FOCUS
VIRUS	PERIL	SEDAN	FIBER
	HONEY		HOTEL
MORON	POWER	BAKER	WAGON
	LOGIC		HUMOR
FORUM	CADET	DEVIL	METAL
	DIGIT		TODAY

Appendix B

INSTRUCTIONS FOR THE 100% EXPLICIT CONTROL GROUP

This is a memory experiment during which you will be asked to learn an association between pairs of words. Your task will be to select those words which you want to learn. Sets of three words will be presented on the screen in front of you. In each set, there will be a stimulus word on the left and two possible response words on the right. Your task is to choose one of the words on the right to be associated with the word on the left. As soon as you decide, please speak the chosen word into the microphone in a clear, loud voice. Your announcement of the chosen word will cause the screen to go blank. In the future, when you see the stimulus word, you will be asked to remember the associated response word.

Do you have any questions?

In order to make the task clearer, the first two sets of words you will see will be practice words. Please announce the chosen word clearly.

I will put a set of headphones on you and you may receive some noise.

Are you ready?

INSTRUCTIONS FOR THE 50% EXPLICIT CONTROL GROUP

This is a memory experiment during which you will be asked to learn an association between pairs of words. Your task will be to select those words which you want to learn. Sets of three words will be presented on the screen in front of you. In each set, there will be a stimulus word on the left and two possible response words on the right. Your task is to choose one of the words on the right to be associated with the word on the left. As soon as you decide, please speak the chosen word into the microphone in a clear, loud voice. Sometimes, your announcement of the chosen word will cause the screen to go blank. In the future, when you see the stimulus word, you will be asked to remember the associated response word.

Do you have any questions?

In order to make the task clearer, the first two sets of words you will see will be practice words. Please announce the chosen word clearly.

I will put a set of headphones on you and you may receive some noise.

Are you ready?

INSTRUCTIONS FOR THE 100% IMPLICIT CONTROL, 50% IMPLICIT
CONTROL, AND NO-CONTROL GROUPS

This is a memory experiment during which you will be asked to learn an association between pairs of words. Your task will be to select those words which you want to learn. Sets of three words will be presented on the screen in front of you. In each set, there will be a stimulus word on the left and two possible response words on the right. Your task is to choose one of the words on the right to be associated with the word on the left. As soon as you decide, please speak the chosen word into the microphone in a clear, loud voice. In the future, when you see the stimulus word, you will be asked to remember the associated response word.

Do you have any questions?

In order to make the task clearer, the first two sets of words you will see will be practice words. Please announce the chosen word clearly.

I will put a set of headphones on you and you may receive some noise.

Are you ready?

INSTRUCTIONS FOR THE DICE GAME

This is a dice game and we will play on the "field". You will be provided with five poker chips and two dice. You can bet one, two, three, four, or five poker chips on the field. After placing the bet, you will throw the dice. If the sum of the two numbers on the dice matches either one of the numbers on the field, you will win; other numbers you will lose. If the sum is 2 or 12, you will win double.

Do you understand?

Before you place the bet, I would like you to rate your expectancy for success on this game using this expectancy measure. On the scale from 0 to 10, "0" means you are not at all confident of success while "10" means you are extremely confident of success.

Do you have any questions?

Appendix C

Memory Task

Below is a list of stimulus words that you have seen previously. Please fill out the blanks placing the response words which you have chosen to learn to these stimulus words. If you are not certain, try anyway.

JEWEL _____

VIRUS _____

DEVIL _____

FORUM _____

ROBIN _____

MONEY _____

TENOR _____

FEVER _____

VAPOR _____

SEDAN _____

MEDAL _____

MANOR _____

BAKER _____

MORON _____

Questionnaire

1. How difficult was it for you to learn the word association task? (Circle one number)

1	2	3	4	5	6	7
Very						Very
Difficult						Easy

2. How do you consider your ability to learn and remember word associations?

1	2	3	4	5	6	7
Very						Very
Poor						Good

3. To what extent were you able to concentrate on the word association task while you were learning the words?

1	2	3	4	5	6	7
Very						Very
Low						High

4. Was the amount of time available adequate for choosing the words to be learned on the word association task?

1	2	3	4	5	6	7
Very						Very
Inadequate						Adequate

5. To what extent did you feel that you could control the duration of the word associations on the screen?

1	2	3	4	5	6	7
Least						Most
Control						Control

6. How would you rate your control in the whole experiment?

1	2	3	4	5	6	7
Least						Most
Control						Control

7. How would you rate your mood at this moment?

1	2	3	4	5	6	7
Very						Very
Unhappy						Happy

8. How would you rate the intensity of the noise during the word association task?

1	2	3	4	5	6	7
Low					High	
Intensity					Intensity	

9. To what extent did you feel that you could control the duration of the noise you received?

1	2	3	4	5	6	7
Least					Most	
Control					Control	

10. To what extent did you feel that you could control the loudness of the noise you received?

1	2	3	4	5	6	7
Least					Most	
Control					Control	

Appendix D

RAW DATA: DECISION TIME IN MILLISECONDS
100% EXPLICIT CONTROL-NO NOISE

URS	11	12	13	14	15	16	17	18	19	110	111	112	113	114
1	2778	2433	3485	3013	2880	2883	2889	2729	2346	2544	2463	2462	2323	2272
2	3373	7201	4820	4447	4177	5578	3720	5434	3475	4936	4727	3622	4358	4021
3	3071	3577	4053	4296	3677	3232	3592	2774	2896	3022	3853	2940	3090	2763
4	2810	3130	2732	2789	2295	2202	2373	2549	2464	2324	2448	2305	2454	2289
5	2769	2769	2769	2690	2513	3506	3420	2769	2870	2646	2769	2278	2589	2396
6	2542	3229	3221	2954	2523	2470	3210	2973	2412	3728	3178	3096	2818	3305
7	2885	3128	3054	3245	3020	2567	3097	2772	2670	3553	3269	2612	2745	2936
8	4315	5139	9899	8162	4882	4803	4842	7007	6846	8432	4870	6943	4245	5783
9	2882	3603	3039	3993	3986	3440	4556	3145	4620	4181	3982	4115	2691	3118
10	2213	1903	1885	1888	3207	2764	2519	2213	2629	2237	2081	2094	1866	2082
11	2470	2604	2861	3204	2909	3134	3741	3139	2598	3231	3476	2937	4331	3315
12	5895	4523	4627	5456	3923	4156	5415	5408	6559	4479	7255	6671	7434	6440
13	2999	3880	3189	3520	3037	2880	2962	3261	2901	3122	2859	3203	2972	3313
14	3766	3127	2817	2808	2783	3133	3283	2926	2896	3157	3692	3441	3157	2876
15	3320	3148	3948	3187	3146	3492	3384	3753	3951	3280	3188	3037	4204	3108
16	3216	4985	2490	3536	3987	3631	3770	3361	3112	4291	1360	3836	2767	4670
17	2884	3547	4045	2948	2623	3032	4372	3120	3540	3848	4316	3692	3405	4511
18	2899	3820	3187	2487	3151	2775	2678	2563	2545	2120	2330	2772	2242	2153
19	3171	5160	3904	4890	2546	2198	5870	4946	5136	3994	6879	3598	4578	3397
20	3488	3532	4532	3804	2563	3315	3484	2964	2683	2967	3251	2855	2710	3803

RAW DATA: DECISION TIME IN MILLISECONDS
100% EXPLICIT CONTROL-NOISE

Obs	11	12	13	14	15	16	17	18	19	110	111	112	113	114
1	3220	6261	5090	4995	2463	5579	4613	3047	3328	3121	4611	3798	2705	4046
2	3490	2788	2788	2245	2173	2005	2874	2278	2131	2912	3681	2721	2365	2588
3	4781	5195	3686	3136	4789	5204	3166	3669	4872	3964	4080	3605	2763	4947
4	3929	5254	5422	6398	5047	5945	4113	4171	6793	4579	7095	4343	3574	4602
5	3286	4872	6016	3510	3975	3911	4493	5179	4798	5029	4845	4113	5112	5012
6	3161	4330	4869	3161	2640	3161	3161	3696	2586	2506	2927	3204	2598	2255
7	2539	2679	2580	2687	2601	2502	2329	2365	2232	2747	2212	2062	2163	2188
8	2634	4404	4630	7303	3295	3094	4822	7654	5071	7303	7671	4932	5429	4057
9	3162	4941	4911	4475	4454	3778	4068	3740	3133	3675	4351	3540	3075	3632
10	3095	4286	3391	4155	4179	4245	5246	4024	3356	4005	3824	3360	3772	2976
11	2546	3583	3679	3547	2746	3315	3222	2804	3623	2320	3430	3437	3224	3242
12	2902	2185	2027	2647	2153	1800	1895	1864	1926	1786	1865	1430	1912	1750
13	2512	3897	3008	2613	3101	4189	2856	3630	3014	3589	4228	4172	3094	3928
14	3503	3705	4505	4654	4595	3505	3846	4262	4705	5484	3409	3499	2962	3771
15	3896	4295	4082	3045	4212	2880	3904	3294	2822	2903	2957	2704	2556	3062
16	3537	2754	2404	3945	3471	4757	4061	3826	3635	4562	5890	4521	6023	5410
17	3382	3556	2963	3754	3386	2704	3170	3448	3486	3161	3307	2839	2830	3428
18	1050	3291	3291	3184	2813	3245	2917	6898	2431	3120	4004	2870	3906	3052
19	2579	2563	1913	2561	3371	2250	2263	2609	2505	3254	2491	2777	2481	2354
20	2643	2126	1804	2553	2186	2411	2420	2660	2321	2570	2353	2401	2552	2198

RAW DATA: DECISION TIME IN MILLISECONDS
100% IMPLICIT CONTROL-NO NOISE

Obs	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14
1	3114	4651	4198	3789	3340	3587	4089	4306	2617	3465	4495	3504	3293	4047
2	2676	3653	3230	4095	2470	3637	3600	3754	2582	3580	3282	3046	4190	2963
3	2504	5897	5824	4754	4864	5222	4231	5146	5046	3387	4236	2911	4937	5372
4	3278	6712	4672	3606	3543	5238	5329	5999	6232	4472	5436	4595	4789	5964
5	3561	4483	3802	5389	4531	4520	3980	3806	4788	4588	4437	4691	3942	3872
6	3152	3061	2072	1573	1512	1672	1908	1896	1881	2127	2107	2300	2170	2121
7	2995	3744	4187	3946	3055	3670	3770	4429	3394	4479	4158	2937	3553	3596
8	4519	4552	6517	3607	7337	4037	3204	8396	4366	5821	4911	4361	4754	6396
9	2398	3093	3172	2838	2079	2152	1971	2206	2045	2040	2021	1977	1957	2204
10	3213	3572	2963	3066	3841	2591	2831	4034	2578	2861	3503	2943	2937	3580
11	2804	3475	4362	3354	3054	3137	3316	4129	3724	3896	3603	3870	2984	3596
12	3987	8673	4145	4652	3812	4530	3099	4290	3005	5745	5514	4837	4930	3879
13	2440	2953	3403	3713	3563	2930	3419	3083	3374	4112	3969	2931	3381	2403
14	2390	2589	2328	2362	2712	2244	2288	2337	2295	2203	2320	2120	2405	2420
15	3145	3610	3679	3093	4252	2633	3361	3312	3126	3266	3205	3298	3125	5644
16	2607	2353	2862	2579	2330	2263	2105	3386	2320	2837	2852	2589	2495	2905
17	2969	3298	7196	8683	9623	5448	4189	4359	6790	3859	9146	6247	8825	9427
18	2786	2524	2027	2144	1981	1639	1948	1969	2056	2464	2291	2472	2620	2271
19	2621	3421	3544	2989	2733	2652	2674	2421	2495	2459	2530	2428	2451	3370
20	3447	3232	2649	2329	2262	2305	2331	2593	2442	2244	2284	2250	2216	2163

RAW DATA: DECISION TIME IN MILLISECONDS
100% IMPLICIT CONTROL-NOISE

Obs	11	12	13	14	15	16	17	18	19	110	111	112	113	114
1	3287	2564	2171	1904	2230	1704	1828	1613	1747	1748	1744	1665	1579	2696
2	2587	2467	2135	2696	2222	2765	2322	2390	2114	2020	2177	2182	1846	2062
3	2721	2609	3034	2658	2499	3120	2423	3075	2715	2441	2955	2598	2670	2965
4	4645	5615	8062	3600	3048	4451	4307	3105	3386	3347	4314	5616	3700	4144
5	2555	2514	3451	2564	2791	2412	2624	2978	2355	2160	2587	2440	2535	2370
6	3489	4061	3106	3179	2984	3141	2691	4396	3921	4730	4296	3388	3125	3629
7	2463	4379	3445	3660	3136	3039	2734	2880	3295	2763	3536	3874	4214	3345
8	2711	2751	2661	3779	2511	2402	3878	2482	2594	2491	2812	2823	2488	3196
9	2762	3264	3110	3063	2773	2643	2625	2631	2825	2815	3066	3399	4079	3719
10	3223	2895	3244	2569	2548	4932	3695	3019	3112	3108	3991	4390	3423	3478
11	2703	3669	3078	3768	2454	2412	2844	3062	2670	2537	2878	2362	2344	2686
12	2745	2781	3612	2380	2075	2154	1907	1880	1795	2192	2342	2165	2113	2079
13	2424	3645	3294	2454	2629	3464	3962	4320	3753	4670	3295	2762	3602	3463
14	3421	5430	3576	6579	4529	3539	3187	3945	3288	4748	4905	3798	4161	3446
15	2965	2669	3539	2437	2696	2937	2537	2821	2914	3119	3637	3422	2754	2623
16	3187	3172	3371	3280	3071	3363	3046	3829	2643	2737	2787	2786	3186	3070
17	2874	1962	2297	1985	1822	1873	2018	2053	1860	2019	1923	2124	2053	1879
18	2805	3520	2695	2462	2606	3333	3045	2745	2678	3216	2665	2677	3375	2862
19	1864	1757	1900	1987	2180	1614	2034	1773	1672	1653	1684	1772	1739	1724
20	2888	2253	2087	2480	2363	2010	2048	2015	2312	2084	2254	2136	2023	2031

RAW DATA: DECISION TIME 14 MILLISECONDS
50% EXPLICIT CONTROL-NO NOISE

005	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14
1	2363	2431	3048	2463	2281	2614	2070	2072	1982	2109	1779	2234	1931	1831
2	3470	6230	3560	3323	4098	3364	7730	5228	3501	5496	6272	5938	5706	6639
3	2722	3313	3225	2721	3105	2806	2895	4165	2455	4349	4189	2810	2784	2929
4	3670	3723	3471	2780	3037	3468	3370	4379	3033	4432	4748	2805	3766	3379
5	2978	3682	6445	2695	4015	4033	4098	3970	2720	4962	4014	3004	4411	4545
6	3002	9830	3774	4145	3237	3019	3290	4154	3139	3469	5652	4449	3516	2336
7	4204	4862	4289	3095	3683	3490	3821	3595	4146	3621	3071	3153	3120	2664
8	3438	3816	3814	3512	3691	3765	3937	3314	3105	4106	4229	3371	3763	3715
9	4754	4362	3490	7129	3755	4420	6478	3715	3495	7572	5545	3889	7320	5331
10	3153	4044	3104	4672	3554	2572	3147	2810	2930	3073	3290	2537	2491	2219
11	2748	3475	2678	2880	2770	3064	4140	4784	7578	3165	3154	4360	4687	4496
12	4450	4321	5346	3854	2774	3019	4151	3898	2587	3627	5821	4037	4953	5271
13	3902	5886	5632	4313	4263	6721	6475	4137	4638	4063	4096	5227	4922	4807
14	2515	5024	3470	3088	3520	3770	3470	3437	3258	4725	5275	4784	3016	4812
15	2921	3670	3071	3149	4334	3612	4150	3426	4429	4109	4353	3759	3612	3347
16	3714	8020	6094	6288	3811	4096	6800	6162	5047	7376	5983	6120	5554	7021
17	4554	6695	5937	4484	4687	4017	5238	4262	4315	4462	4263	3976	4787	4583
18	4012	4816	4193	3681	3663	5100	3642	4252	3420	4168	4587	4645	3874	4648
19	2721	3071	2486	2419	2354	2112	2187	2608	2078	2362	2817	2000	2493	2420
20	4006	6198	4398	4311	7406	3310	3737	4778	5351	3658	4681	3828	6354	4665

RAW DATA: DECISION TIME IN MILLISECONDS
50% EXPLICIT CONTROL-NOISE

UNS	11	12	13	14	15	16	17	18	19	110	111	112	113	114
1	3462	4147	3581	3525	3780	3786	3364	4762	3757	4066	4882	2988	3152	2798
2	3229	4198	3363	4451	3971	3261	3663	3660	3486	3539	3348	4188	3852	3562
3	3250	4162	4726	3611	3219	3222	3512	3572	3519	4013	3061	2906	3592	3888
4	3503	3436	3437	2912	2535	3609	3877	3954	3505	3294	4831	2785	3382	2645
5	3129	3572	2476	2504	2567	2298	2597	2586	2562	2468	2604	2128	2141	2651
6	4064	5408	3458	3818	3457	3631	7613	4519	5020	3961	5179	3187	5263	4345
7	2790	3530	3272	3178	4771	3494	3679	3345	3238	3546	3563	3189	3199	2913
8	4203	4996	3374	3819	3524	3655	5938	6678	9555	4967	4295	6848	7830	3298
9	4896	9191	7160	5688	4879	5636	6406	5495	4262	5732	5832	4014	5683	4625
10	3087	2945	3199	3011	2481	2472	2631	2648	3273	2798	2806	2436	2423	2198
11	5743	5628	6104	4228	5433	3337	6491	4843	3963	6465	5092	4514	3140	4606
12	5037	8153	6771	3007	3730	4846	6095	5367	3455	5950	5386	3661	4826	4614
13	3407	4765	4438	4445	4604	3629	4009	4063	4087	4080	4836	4232	4081	3789
14	2331	2747	2443	3047	3272	3082	2945	2551	2779	3162	2643	2642	2576	2551
15	2496	3430	2787	4645	2771	2971	3073	3279	3087	3995	4087	2237	1471	2731
16	2697	2740	2621	2492	2569	2679	2606	2749	2580	2772	2764	2571	2472	2486
17	3246	5627	4129	3437	4140	3096	2969	4250	4768	6845	5204	3505	3211	2791
18	2928	3878	3833	2726	2648	2887	2734	2689	2403	3187	2676	2662	2813	2522
19	2421	4319	3598	3327	4004	6154	3045	4323	4613	3970	3756	3204	5771	3115
20	3661	4828	4078	3096	3705	4653	4482	4254	5053	5965	4726	5222	4956	5396

RAW DATA: DECISION TIME IN MILLISECONDS
S02 IMPLICIT CONTROL=NO NOISE

UNS	11	12	13	14	15	16	17	18	19	110	111	112	113	114
1	6431	7751	4012	4207	5095	4420	4572	4542	4702	4572	5136	4321	4029	2955
2	2818	2178	4021	2813	2989	3411	3491	2911	3342	3450	2971	3462	3508	2286
3	2876	5845	4981	3754	5475	4532	5071	4595	6005	3505	3187	3427	3382	4323
4	2759	5131	3331	3319	5294	3211	3198	3347	3673	2939	3954	4009	3267	3563
5	5163	2173	2832	3294	2782	3264	3413	3313	3756	3264	3177	2578	3530	3194
6	3262	3695	4256	4196	3890	2463	3746	3524	3331	3498	3640	2439	2930	2510
7	3692	5138	3931	3314	3796	3930	4320	4001	4447	4279	4388	3545	4513	3879
8	2930	9750	3380	3060	8206	4232	5838	3325	3095	3122	2754	4142	3931	4423
9	2710	3123	2863	2895	3118	2183	3398	2407	3882	3355	4506	3204	3494	2566
10	3268	3020	2937	2990	4379	2738	2994	2663	3445	3238	2965	3503	3853	2729
11	2011	2901	2921	2277	2127	2579	3834	2731	2407	3708	2887	2495	3076	2354
12	4329	4498	3570	3273	4129	3565	4419	2378	3019	3543	2727	2446	2171	2227
13	2908	4264	3813	3925	4190	4504	4051	3906	3020	3179	3677	3720	3153	5071
14	3239	4839	4413	3003	3537	3932	4611	3137	3062	4331	3787	3012	2987	3246
15	2927	3587	2949	2748	3232	2230	2844	3055	2615	2463	2999	2697	3171	3014
16	3396	4865	6653	3187	4048	5617	6815	5267	3705	5723	3182	3621	4563	7238
17	2513	2105	2620	2047	1993	1863	1947	1684	1656	1870	1706	1695	1853	1545
18	3023	4128	3579	4645	3864	4314	4048	5645	4103	3921	3620	4313	4388	4111
19	3520	4704	5324	3448	6521	4321	5028	3708	3670	4580	3845	5520	4784	8003
20	3429	4246	3263	4580	3813	5365	4782	7069	5378	4640	7391	4395	8621	4935

RAW DATA: DECISION TIME IN MILLISECONDS
50% IMPLICIT CONTROL-NOISE

ONS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14
1	3453	5229	4196	3303	2023	5372	3167	3294	2976	4661	3525	3462	2975	4252
2	2978	2785	3689	3012	2867	3059	3309	3378	2876	3345	3251	3293	2774	3825
3	4810	5521	4245	3307	3065	4314	3411	3029	3122	4015	3572	3471	3170	3197
4	2646	3046	3317	2605	3770	3438	3065	3085	2823	3167	3527	3045	3612	2645
5	2715	3730	3040	2446	3005	3046	3071	2579	2795	2790	2914	2641	3187	2756
6	4579	6214	6120	3986	3025	5210	2208	3650	4581	4946	4329	3824	4126	3607
7	2953	3736	4411	3640	3333	3520	4101	3503	2796	4538	5123	3413	3614	4597
8	3446	8401	4330	4514	3063	4414	4372	4041	2949	4928	5279	4498	5571	4512
9	3354	5504	4429	4012	3489	3970	5312	5270	5262	4710	5164	4312	5120	4281
10	3681	4965	5113	2618	3032	4226	4375	3099	4022	5230	3348	4372	6546	5789
11	3557	2515	2444	2296	2917	2426	3946	3589	2474	2678	3237	3268	2779	2712
12	3165	3205	2404	2621	2457	2247	3031	2170	2804	3186	2346	2245	2837	2398
13	3479	3953	3299	3039	5780	3963	4099	4949	4047	5312	4048	3083	3496	4078
14	2577	3230	3270	3053	2362	2296	4047	3057	2398	2845	2836	2838	2415	3587
15	3163	3671	3374	3546	4246	3467	4271	3321	2887	3806	3398	3084	3214	4249
16	4521	5262	4441	3134	3096	3063	4212	3782	3845	4519	4063	3075	4197	4035
17	3404	4704	3320	2979	3154	3120	3367	5221	5179	3862	4322	2595	2913	4054
18	7080	5531	3203	3244	4029	4379	5469	4452	4691	4488	4445	3267	4454	4094
19	4747	4963	6245	5179	4695	4279	5721	6221	7094	5989	5223	4513	5163	2890
20	3637	4075	3168	2487	3049	3337	2766	2452	2653	2623	3078	2406	2366	2088

RAW DATA: DECISION TIME IN MILLISECONDS
NO CONTROL-NO NOISE

Obs	11	12	13	14	15	16	17	18	19	110	111	112	113	114
1	3471	4161	4306	3144	3422	3762	4250	3534	4325	3876	4067	3368	3651	4567
2	3399	6006	4025	5305	4139	3505	3663	3470	2871	3054	4054	5065	4724	5420
3	3307	6414	7403	7694	6200	4382	7107	3186	5874	6095	7382	4320	6338	8338
4	3553	5512	6961	6180	6246	6319	7044	5120	4489	5315	4539	4103	4985	5437
5	3429	4850	4006	4808	5034	4150	4548	5372	4378	5014	5332	4354	3162	5714
6	3503	6840	4546	5815	5046	4473	7548	7270	4846	6814	6440	4077	8502	5697
7	2553	2877	2666	2740	2576	2584	2814	2561	2720	2695	3421	3853	3634	3053
8	2442	6380	4960	3723	5346	4856	6898	4353	5437	6381	6423	6574	3216	5471
9	3571	5927	4899	8162	5178	4432	4744	4230	3382	6494	5624	5974	8572	4572
10	3480	6123	8038	4223	3357	4078	4012	2474	6864	5034	7704	2498	3444	3920
11	3613	4264	4464	5203	4564	3662	4524	5046	5384	5181	4362	4446	5024	6152
12	3630	4563	4747	4334	3438	4180	6738	5631	4512	4805	4034	4857	4013	3806
13	3044	3271	3576	3325	2588	4262	3205	3221	3973	3180	3478	3476	3146	2498
14	3064	4675	5471	4602	3261	3784	3885	5462	4355	4703	5471	5244	4615	5831
15	4747	3740	3562	3241	3052	2472	4536	3128	3280	3230	3279	3152	2903	5221
16	3517	5620	7820	6538	8144	4500	4174	8425	8965	9420	7564	7673	7040	4754
17	4148	7562	6464	7472	8641	8712	8402	8811	9451	9872	7632	9452	7120	7748
18	4013	4327	6874	7446	8924	7446	5782	6514	4824	4832	7320	4737	7439	5264
19	3201	7472	4848	5613	4311	5174	4242	7812	4458	5971	6723	4472	6109	7088
20	2654	3003	3227	2742	2472	3210	2242	2441	2704	3354	4089	2740	3244	3027

RAW DATA: DECISION TIME IN MILLISECONDS
NO CONTROL-NOISE

obs	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14
1	3255	3323	6402	5229	3096	3981	5023	0305	0714	5671	7120	5770	7387	7529
2	4737	6033	0393	6053	0328	5459	0095	7181	6729	8277	4506	4204	5989	5123
3	2980	5188	7309	4326	4276	5030	2733	4614	2941	4104	5279	2987	4906	4370
4	3421	3489	3946	3640	3569	3445	3464	3839	4070	3662	5287	3897	4378	4421
5	2797	3631	4862	3554	5197	4340	3497	3543	4337	4328	4338	4837	4792	7522
6	3080	0495	5721	5285	4895	5303	6970	0143	4812	5139	5746	5345	5363	6344
7	2298	2524	2463	2123	2206	2239	2082	2441	2090	1930	1955	1607	1844	1843
8	2481	4086	5362	5620	4682	6363	5836	4519	3004	4529	4812	3646	5181	2830
9	2847	4323	4207	5437	3876	5313	3179	3571	2936	4184	3789	3546	2962	2864
10	3071	4011	3609	4311	2620	4470	2341	3586	4413	3131	3620	3712	2382	3137
11	4960	5270	9670	7337	7699	7037	7259	7431	5886	8086	8838	5937	6826	7061
12	2621	3105	3866	4505	4479	3748	3605	3791	3399	3815	4964	3780	5188	3724
13	3081	4705	4821	3453	3968	4454	3938	3529	3195	3521	4758	4029	3187	4256
14	3744	6363	5591	4646	4720	5895	5988	7270	5600	5029	6205	4253	4558	5806
15	6432	4412	4087	5913	0706	5489	0737	0646	7186	5528	5605	5065	5838	6058
16	4362	2378	2939	3003	2730	3272	2679	2639	2896	2455	3047	2441	3340	3221
17	2018	2107	2646	2506	2479	2323	2601	2640	2537	2712	2724	2569	3365	2267
18	3089	4380	6004	5670	4749	4662	3801	4541	5050	7047	7891	4465	7649	7010
19	3431	5023	4802	4320	4354	4955	4708	4955	4685	0623	5377	6481	5580	5940
20	4096	8120	4122	5903	3431	4697	4081	7413	3853	5480	9579	3639	3838	4887

Appendix E

RAW DATA: EXPECTANCY DET SIZE MEMORY QUESTIONNAIRE IE UC SDS
100% EXPLICIT CONTROL-NO NOISE

nos	EXP	DET	MEM	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	IE	UC	SDS
1	3	1	4	2	3	5	2	1	2	3	.	.	.	0	121	31
2	5	1	7	4	5	4	5	3	4	4	.	.	.	9	100	33
3	5	1	5	5	2	6	5	5	5	4	.	.	.	19	98	46
4	6	1	1	5	4	4	4	2	3	5	.	.	.	7	105	34
5	7	3	6	7	4	5	5	5	5	5	.	.	.	12	94	37
6	4	5	4	4	2	5	3	4	4	5	.	.	.	8	108	27
7	4	5	5	5	3	4	5	6	4	4	.	.	.	22	100	40
8	7	5	7	5	5	3	5	3	5	3	.	.	.	9	103	30
9	4	5	6	6	5	4	3	2	4	4	.	.	.	19	90	46
10	3	2	1	7	2	3	3	1	2	2	.	.	.	12	90	37
11	3	2	9	4	5	4	6	4	3	3	.	.	.	15	83	36
12	5	2	7	4	6	1	7	1	1	2	.	.	.	14	.	29
13	7	3	3	3	5	5	4	3	4	5	.	.	.	4	98	28
14	5	3	7	4	5	3	2	5	3	5	.	.	.	4	117	29
15	5	3	2	5	5	2	2	2	3	4	.	.	.	10	45	42
16	5	3	6	5	3	5	6	6	5	5	.	.	.	10	83	43
17	4	3	4	2	6	4	6	6	3	3	.	.	.	4	110	26
18	2	3	2	3	6	5	1	2	2	1	.	.	.	8	82	50
19	3	3	3	3	4	4	3	6	4	5	.	.	.	8	112	37
20	4	2	1	5	5	5	7	5	3	4	.	.	.	12	111	41

RAW DATA: EXPECTANCY DET SIZE MEMORY QUESTIONNAIRE IE DL SDS
100% EXPLICIT CONTROL-NOISE

UBS	EXP	DET	MEM	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	IE	DL	SDS
1	6	1	0	0	2	4	3	3	3	5	4	4	1	9	40	36
2	5	2	7	5	7	3	2	2	3	4	5	1	1	11	106	44
3	5	3	3	7	1	2	3	2	3	5	6	1	1	13	80	24
4	2	1	1	7	2	1	7	2	2	6	5	2	1	3	118	22
5	5	2	3	7	2	4	4	7	4	4	5	7	1	9	117	36
6	7	2	0	7	1	3	2	1	2	6	6	2	2	15	48	47
7	7	3	0	2	3	0	0	3	0	3	4	3	2	5	116	23
8	3	1	3	7	3	4	3	3	4	2	1	5	2	8	111	38
9	0	1	0	0	4	4	3	3	4	0	3	5	2	1	102	28
10	5	2	3	3	3	3	3	3	3	5	4	2	2	20	88	34
11	7	3	6	2	3	4	3	4	3	4	5	3	2	5	112	37
12	4	3	3	4	3	3	3	3	3	7	3	3	2	5	90	32
13	8	3	1	2	0	0	7	0	3	6	3	4	4	6	125	32
14	7	3	3	4	5	3	7	3	4	4	0	7	1	5	120	27
15	0	3	7	5	4	4	0	3	3	3	3	0	3	1	107	31
16	3	1	3	3	3	2	3	3	3	3	3	2	2	1	107	31
17	5	2	4	0	3	3	3	2	3	3	3	1	2	15	44	33
18	6	2	8	0	0	3	0	0	3	3	5	0	2	7	116	25
19	4	2	8	7	6	2	4	0	3	3	5	2	1	1	97	32
20	2	3	10	3	5	7	7	0	5	4	4	3	5	14	107	28

RAW DATA: EXPECTANCY BEL SIZE MEMORY QUESTIONNAIRE IE DC SDS
100% IMPLICIT CONTROL-NO NOISE

Obs	EXP	BEL	MEM	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	IE	DC	SDS
1	5	1	4	5	5	3	5	4	4	5	.	.	.	6	47	34
2	5	3	4	3	5	4	5	4	5	5	.	.	.	7	104	30
3	4	2	4	4	5	2	7	6	6	3	.	.	.	12	98	45
4	4	4	4	7	1	4	3	7	6	2	.	.	.	15	114	28
5	1	1	2	7	3	1	4	2	1	2	.	.	.	15	103	36
6	3	1	4	7	1	3	3	1	2	3	.	.	.	10	91	32
7	5	2	1	7	6	7	7	0	6	6	.	.	.	10	109	36
8	5	2	1	3	5	3	4	0	5	5	.	.	.	9	114	34
9	5	1	5	3	5	4	3	1	4	4	.	.	.	11	120	26
10	4	3	12	3	4	6	4	3	4	3	.	.	.	20	105	41
11	4	3	3	3	3	3	2	3	4	5	.	.	.	8	116	28
12	4	2	3	7	2	3	2	4	4	5	.	.	.	10	98	40
13	5	2	6	4	3	3	7	4	3	4	.	.	.	6	113	25
14	2	1	10	3	4	5	2	1	1	5	.	.	.	4	106	27
15	5	2	6	3	4	2	5	1	5	4	.	.	.	4	106	31
16	5	2	7	5	4	3	3	3	5	5	.	.	.	15	71	47
17	5	2	7	5	4	3	3	3	5	5	.	.	.	6	118	25
18	5	2	7	5	4	3	3	3	5	5	.	.	.	17	106	51
19	5	2	7	5	4	3	3	3	5	5	.	.	.	9	85	31
20	0	1	3	3	3	2	4	3	3	4	.	.	.	11	97	33

RAW DATA: EXPECTANCY BEL SIZE MEMORY QUESTIONNAIRE IE DC SDS
100% IMPLICIT CONTROL-NOISE

Q05	EAP	BEL	MEM	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	IE	DC	SDS
1	5	3	9	4	4	3	2	4	5	2	0	2	2	11	116	32
2	4	1	3	5	3	4	2	3	3	4	5	1	2	13	169	46
3	2	1	5	5	4	4	5	3	3	4	5	1	1	10	100	34
4	4	3	7	1	4	5	4	2	7	4	3	1	1	8	100	26
5	4	3	7	0	3	4	4	7	2	4	2	2	1	11	103	40
6	0	2	3	0	3	3	5	1	4	4	5	7	1	12	42	24
7	1	2	4	5	4	4	2	4	5	2	3	2	5	8	103	47
8	3	2	5	3	2	5	3	4	5	3	3	2	5	10	103	36
9	7	2	7	5	5	5	5	5	4	5	5	5	5	10	111	35
10	7	1	5	5	5	5	3	4	4	5	5	5	5	13	97	35
11	5	3	5	5	5	5	3	2	2	2	0	3	3	5	124	25
12	4	3	5	5	5	2	1	2	2	0	0	3	3	13	108	27
13	0	2	5	5	4	5	3	3	3	3	0	3	5	14	101	33
14	0	2	5	5	5	3	3	3	3	3	0	3	4	5	100	33
15	4	2	5	5	1	3	2	1	2	3	0	1	3	5	126	33
16	5	2	5	5	5	0	1	4	2	5	5	2	1	5	6	33
17	5	2	5	5	0	3	1	4	2	5	5	2	1	5	7	31
18	0	2	3	5	4	3	5	2	3	3	7	3	1	0	47	27
19	4	2	2	2	2	3	5	2	2	3	4	3	1	8	101	42
20															85	33

RAW DATA: EXPECTANCY BEL SIZE MEMORY QUESTIONNAIRE IE DC SDS
504 EXPLICIT CONTROL-NO NOISE

UBS	EXP	BET	MEM	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	IE	DC	SDS
1	1	2	2	5	5	4	4	3	4	5	.	.	.	13	87	38
2	7	2	5	3	3	5	5	4	4	4	.	.	.	1	119	25
3	4	2	8	2	4	4	5	4	4	5	.	.	.	14	89	31
4	5	2	5	0	5	2	3	3	3	2	.	.	.	12	93	35
5	8	2	5	0	4	4	0	4	4	0	.	.	.	7	112	30
6	1	2	10	1	0	5	4	4	4	5	.	.	.	16	109	34
7	5	2	5	5	5	4	3	6	4	3	.	.	.	12	98	44
8	6	3	7	5	4	3	3	1	4	5	.	.	.	4	105	25
9	7	1	3	0	3	4	4	3	4	5	.	.	.	4	124	24
10	1	1	12	0	5	0	0	2	2	7	.	.	.	9	107	20
11	0	3	4	0	5	5	3	1	1	4	.	.	.	11	103	24
12	5	3	10	1	5	5	4	3	3	5	.	.	.	15	92	31
13	0	1	0	5	4	2	3	2	2	3	.	.	.	14	107	36
14	0	3	2	7	5	4	5	2	5	2	.	.	.	11	100	35
15	7	3	7	3	5	5	5	2	5	7	.	.	.	7	109	24
16	5	3	5	4	4	5	4	2	3	0	.	.	.	4	85	43
17	1	3	2	0	2	2	3	3	2	3	.	.	.	3	108	35
18	7	3	4	5	4	3	3	3	3	0	.	.	.	14	100	38
19	1	3	4	5	2	3	3	3	3	5	.	.	.	13	110	32
20	2	1	4	5	2	4	2	3	3	5	.	.	.	17	88	27

RAW DATA: EXPECTANCY DET SIZE MEMORY QUESTIONNAIRE IE DC SDS
50% EXPLICIT CONTROL=NOISE

000	EXP	DET	MEM	01	02	03	04	05	06	07	08	09	010	IE	DC	SDS
1	5	2	7	5	4	3	3	2	4	5	5	2	2	8	103	35
2	5	3	0	5	3	3	3	1	1	2	3	1	1	10	105	34
3	4	1	0	5	0	5	6	2	1	2	3	1	2	3	107	33
4	6	2	0	5	3	5	1	1	3	4	4	1	1	3	115	31
5	4	2	2	5	0	2	6	1	4	0	7	1	1	1	84	41
6	7	2	2	4	2	0	0	4	0	0	1	2	1	16	106	38
7	7	2	0	5	4	5	0	5	0	0	5	4	2	10	97	33
8	3	2	5	5	2	2	1	2	4	4	4	2	4	1	92	33
9	6	3	5	7	3	5	1	1	1	3	0	1	2	1	106	31
10	1	1	2	0	1	5	3	2	0	5	4	2	2	1	82	32
11	1	1	0	0	4	4	4	1	2	3	4	2	1	1	115	30
12	5	1	0	0	4	4	3	4	3	4	3	0	0	3	91	28
13	3	5	0	0	4	4	3	4	3	4	3	0	0	3	110	43
14	9	5	0	2	7	0	0	3	3	5	0	1	5	1	116	26
15	7	5	0	5	3	0	0	2	0	5	0	1	2	0	88	41
16	5	5	0	5	3	0	3	1	1	4	0	1	1	1	88	41
17	4	2	0	4	5	0	3	1	4	0	0	1	1	1	104	36
18	7	3	4	3	3	2	1	1	3	0	0	1	1	1	112	30
19	4	3	1	4	4	3	5	1	1	0	0	1	1	1	107	28
20	2	3	1	4	4	3	5	1	1	0	0	1	1	1	107	28

RAW DATA: EXPECTANCY BEL SIZE MEMORY QUESTIONNAIRE IE DC SDS
50% IMPLICIT CONTROL-NO NOISE

IND	EXP	BEL	MEM	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	IE	DC	SDS
1	5	1	5	5	5	4	5	1	1	5	.	.	.	9	100	30
2	6	2	8	4	3	2	3	4	4	3	.	.	.	3	110	41
3	6	2	8	4	2	3	3	1	2	4	.	.	.	10	111	41
4	4	2	8	4	5	2	3	3	4	3	.	.	.	9	109	20
5	7	7	7	1	4	2	2	1	3	4	.	.	.	7	107	46
6	7	2	7	3	4	2	1	1	3	5	.	.	.	4	120	20
7	6	2	6	5	6	2	5	2	2	2	.	.	.	10	95	37
8	6	2	6	7	2	2	2	3	2	3	.	.	.	15	94	36
9	6	2	6	7	4	2	2	3	2	3	.	.	.	6	44	46
10	6	2	6	7	2	2	2	3	2	4	.	.	.	12	118	27
11	7	2	3	3	3	7	2	4	2	3	.	.	.	8	90	42
12	7	2	3	4	3	2	2	4	2	3	.	.	.	14	46	31
13	3	2	3	4	4	2	4	2	2	3	.	.	.	14	36	32
14	3	2	3	4	4	2	4	2	2	3	.	.	.	13	42	34
15	5	2	3	5	4	2	2	2	2	5	.	.	.	8	122	25
16	5	2	4	5	3	4	3	2	3	5	.	.	.	7	46	26
17	7	2	6	5	3	4	3	2	3	5	.	.	.	10	67	37
18	4	2	6	6	3	5	3	3	4	6	.	.	.	6	107	20
19	4	2	6	6	3	5	3	3	4	6	.	.	.	11	83	34
20	7	2	8	6	4	5	4	2	2	6	.	.	.	17	40	43

RAW DATA: EXPECTANCY BEL SIZE MEMORY QUESTIONNAIRE IE DC SDS
50% IMPLICIT CONTROL-NOISE

URS	EXP	BEL	MEM	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	IE	DC	SDS
1	4	1	11	1	0	0	0	4	5	7	0	5	0	10	101	33
2	5	NNN	50	4	1	5	0	3	4	3	5	2	4	8	105	31
3	0	NNN	4	0	1	5	3	1	1	3	1	1	1	6	102	40
4	0	NNN	4	0	2	2	3	4	1	3	3	4	5	13	80	48
5	4	NNN	3	5	3	2	3	3	3	4	5	2	2	11	104	35
6	4	NNN	3	7	2	1	2	3	2	4	4	2	1	13	115	20
7	4	NNN	0	2	5	0	7	1	2	1	5	1	1	11	111	34
8	7	NNN	0	3	5	0	4	2	2	4	5	2	2	7	111	35
9	3	NNN	3	0	4	4	4	4	3	3	2	NNN	4	6	120	20
10	5	NNN	2	7	4	3	4	2	1	5	4	NNN	0	15	119	30
11	5	NNN	1	2	0	0	4	2	1	0	5	0	0	14	101	34
12	5	NNN	1	2	4	0	4	2	1	0	5	1	1	11	43	32
13	3	NNN	5	5	4	5	5	1	1	3	5	1	3	13	49	40
14	7	NNN	4	5	4	5	3	3	3	4	4	2	1	11	48	24
15	0	NNN	0	7	4	4	2	2	2	5	5	2	1	7	45	33
16	5	NNN	0	3	5	4	0	3	3	0	0	5	4	10	45	33
17	5	NNN	7	1	5	4	4	3	3	7	5	1	1	5	102	20
18	4	NNN	10	0	5	1	7	3	3	5	0	5	1	4	103	47
19	2	NNN	5	3	4	4	3	2	2	1	5	2	2	4	107	47
20	5	NNN	0	4	5	3	3	1	4	5	0	NNN	2	10	84	44

RAW DATA: EXPECTANCY BEL SIZE MEMORY QUESTIONNAIRE IE DC SDS
 NO CONTROL-NO NOISE

ODS	EXP	BET	MEM	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	IE	DC	SDS
1	7	2	4	5	4	4	0	4	5	0	.	.	.	0	05	20
2	5	2	10	5	5	0	7	0	0	7	.	.	.	55	09	38
3	0	2	12	0	0	0	7	0	0	5	.	.	.	10	90	33
4	5	2	4	1	0	5	2	5	5	5	.	.	.	10	06	37
5	0	2	1	0	0	5	2	5	5	4	.	.	.	13	46	30
6	5	2	3	4	2	5	1	0	5	0	.	.	.	10	14	29
7	2	2	0	5	2	5	3	0	7	0	.	.	.	12	55	08
8	2	2	5	7	1	5	0	5	3	5	.	.	.	10	12	27
9	7	2	5	5	2	5	0	5	3	5	.	.	.	10	01	46
10	4	2	1	7	2	2	0	5	3	5	.	.	.	10	02	44
11	4	2	4	5	2	5	0	5	3	5	.	.	.	10	04	37
12	4	2	4	5	2	5	0	5	3	5	.	.	.	10	04	34
13	4	2	4	5	2	5	0	5	3	5	.	.	.	10	04	35
14	4	2	4	5	2	5	0	5	3	5	.	.	.	10	04	35
15	4	2	4	5	2	5	0	5	3	5	.	.	.	10	04	35
16	5	2	0	7	2	5	3	0	5	5	.	.	.	10	01	38
17	5	2	0	4	2	5	3	0	5	5	.	.	.	10	01	38
18	5	2	0	4	2	5	3	0	5	5	.	.	.	10	01	38
19	5	2	0	4	2	5	3	0	5	5	.	.	.	10	01	38
20	5	2	0	4	2	5	3	0	5	5	.	.	.	10	01	38

RAW DATA: EXPECTANCY BEL SIZE MEMORY QUESTIONNAIRE IE DC SDS
NO CONTROL-NOISE

OMS	EXP	MET	MEM	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	IE	DC	SDS
1	3	2	3	2	3	4	7	5	4	2	6	3	1	14	93	35
2	9	1	10	2	5	4	6	7	6	7	5	1	1	17	83	27
3	4	2	8	3	6	4	7	2	1	4	5	1	1	18	78	44
4	0	4	4	5	4	5	5	4	2	3	2	2	4	13	96	35
5	2	2	1	3	3	1	1	3	2	4	6	2	3	12	99	32
6	4	0	6	4	5	4	5	4	4	5	4	6	6	11	104	30
7	0	0	0	4	3	3	7	3	4	3	5	1	2	8	114	45
8	0	0	8	4	4	3	4	3	4	3	5	1	1	14	106	34
9	0	0	10	3	5	5	7	0	6	5	6	5	1	8	115	26
10	0	0	11	1	3	3	7	5	5	4	3	5	6	17	90	34
11	0	0	11	6	5	4	3	2	3	4	4	1	1	11	97	37
12	5	0	3	5	2	5	6	2	1	3	4	2	1	14	97	37
13	5	0	10	5	5	4	0	0	4	7	2	2	3	13	120	31
14	0	0	12	2	5	5	7	0	6	5	5	1	1	4	110	27
15	4	0	4	1	5	3	0	3	2	5	5	1	1	13	106	31
16	4	0	2	0	7	3	4	4	3	5	4	2	2	15	95	40
17	7	2	0	0	7	3	7	4	5	5	4	3	3	11	102	31
18	5	5	0	5	3	5	5	3	4	6	3	2	2	8	90	33
19	7	2	0	0	5	5	4	1	4	6	5	1	2	11	90	33
20	4	1	0	0	5	3	4	2	3	5	5	2	2	10	104	41

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