PERCEIVED PROBLEM DIFFICULTY, PERSEVERANCE, AND SUCCESS IN THE LOCUS OF CONTROL-AFFECT RELATIONSHIP

BRIAN TODD LEADER, B.A.C.S.

Perceived Problem Difficulty, Perseverance, and Success in the Locus of Control-Affect Relationship

by

Brian Todd Leader, B.A.C.S

A thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Master of Science

Department of Psychology
Memorial University of Newfoundland

April, 1990

St. John's Newfoundland

ISBN 0-315-61780-2

Abstract

A number of research efforts in various areas of psychology, have substantiated a relationship between perceived control of reinforcement and affective states. Specifically, the perception that such control is internal (as opposed to external) is associated with positive affect. In the present study, an investigation was conducted which attempted to delineate the process by which this relationship occurs. A causal model was hypothesized which consisted of the following four steps: (1) The perception of internal control is associated with less perceived problem difficulty. (2) Less perceived problem difficulty in turn elicits greater perseverance. (3) This greater perseverance produces greater success. (4) This greater success in turn causes a more positive change in affect. Using a specially designed computer program which involved attempts at solving mazes, support was found for each of the four steps in the model. Implications of these results are discussed.

Author Notes

This paper constitutes fulfillment of the author's Master's thesis requirements.

Special thanks is extended to Dr. T.E. Hannah, who served as my supervisor and greatly enhanced my educational process with his guidance, support, and patience with my impatience.

I would also like to express my appreciation for the insightful comments and assistance provided by Dr. A.S. Ross and Dr. A. Kozma, who served on my thesis committee.

A great debt of gratitude is owed, as well, to Avery Earle, whose meticulous character and programming expertise made this study possible.

I would also like to thank my parents, Alda and Brian, for creating in me a sense of ambition, and for giving me the feeling of confidence and personal control necessary to act on that ambition.

Finally and most enthusiastically, I wish to thank my wife, Alma, without whose love, support, patience, and encouragement this would never have happened.

Table of Contents

Table of Contents (cont'd)

Table of Contents (cont'd)

Tables

Figures

Appendices

Introduction

Overview

Perceived control may be defined as a belief in a direct relationship between an individual's behavior and the reinforcement he/she receives. In other words, it is a perception that one's own actions, not some external force such as luck or circumstances, determine the outcome of a given situation. An individual's generalized expectancy regarding the strength of this behavior-reinforcement relationship is referred to as locus of control.

In the following section, the relationship between perceived control/locus of control and affect is outlined. (Various conceptions or aspects of affect are discussed according to the intentions of previous researchers. The present author's operational definition is outlined in the method section.) A series of possible mediators of this relationship are then discussed (perception of problem difficulty, perseverance, and success), which comprise the causal model being tested in the present study.

Perceived Control and Affect

One area of research, which has contributed substantially to the understanding of control-related factors, is the work of Seligman and his colleagues (Overmier & Seligman, 1967; Seligman & Maier, 1967). Seligman coined the term "learned helplessness" (Overmier & Seligman, 1967) to refer to the fact that uncontrollable electric shock administered to dogs seemed to interfere with the learning of escape or avoidance behavior at a later time. The term "learned helplessness" not only serves as a label, but also as a descriptor for the process which seemed to be taking place. The dogs had learned that responding was futile. That is, they had learned that reinforcement occurred independently of their own behavior. Since these initial findings were reported, the helplessness phenomenon has been demonstrated quite reliably in humans, using a variety of different paradigms (Seligman, 1975).

The relationship between learned helplessness and affective states became apparent when Seligman (1972) noted the similar characteristics of helplessness and reactive depression. Research designed to test Seligman's proposition converged, with relative consistency, on similar conclusions (Miller & Seligman, 1973; Gatchel, Paulus, & Maples, 1975; Miller & Seligman,1975; Seligman, 1975). There is clearly a relationship between the perception that responses and reinforcement are independent of each other, and factors

associated with depression.

Langer and Rodin (1976), experimentally manipulated the perception of contingency/non-contingency between responses and reinforcement among residents of a nursing home, and examined its effects upon affect. While one group was given freedom to make choices for themselves, another was not. For the latter group, the emphasis was on staff control and decision-making power. The results indicated that the perceived-control group experienced a greater increase in self-reported happiness than the no-control group. Eighteen months later, in a follow-up study, Rodin and Langer (1977) obtained nurses ratings of the residents' happiness. On this measure, the residents in whom the perception of control had been induced were rated as significantly happier than either those given the perception of no control, or those in the no-treatment group.

In a similar study, Schulz (1976) allowed one group of nursing home residents to control the duration and frequency of visits by an undergraduate student, without knowing when they would occur. Subjects in a second group were informed of when the visitor would arrive, but could not control how long or how often the visits would be. The first group, therefore, had some control but no predictive ability, while the second group had predictive ability only. A third group experienced a random variation of the first two conditions, and a fourth received no treatment. It was found that when the data from the first two groups were combined for analysis, and compared with the last

two groups, a significant difference emerged. That is, subjects in the control/predict group were happier than those in the random/no-treatment group. These results are therefore consistent with those of Langer and Rodin (1976). They are also consistent with the learned helplessness research discussed earlier, in that they demonstrate a clear connection between perception of control and affective states. Although an attempt to replicate the long-term findings of Rodin and Langer (1977) did not succeed, the discrepancy is quite justifiably attributed to methodological differences between the studies (Schulz & Hanusa, 1978).

In all of the research described above, perceived control was experimentally induced and manipulated, and was therefore situation-bound. However, there exists another dimension to this concept, namely, stability across situations.

Research which has examined the concept of control as a stable personality trait is that of internal versus external control of reinforcement. This work stems from social learning theory and the work of Phares (1957), Rotter, Liverant, and Crowne (1961), Rotter and Mulry (1965), Rotter (1966),and Lefcourt (1966). This locus of control construct, as it became known, is described by Rotter (1966) as a generalized expectancy regarding internal or external control of reinforcement. It is a set of beliefs regarding the extent to which the reinforcement a person receives is dependent upon, or caused by, one's own behavior. This perception is held by each

individual with relative consistency across situations (although, according to Rotter (1982), many researchers, in not reading his initial words (Rotter, 1966) carefully enough, have approached this issue of consistency with too much rigidity, and have not allowed for the normal fluctuations caused by variability in the clarity of situational information.).

Hiroto (1974) has investigated the relationship between locus of control as a personality variable, and affective states. He proposed that the structures underlying learned helplessness and an external locus of control are identical. That is, both represent a belief that one's behavior and the reinforcement he/she receives are independent of each other. Hiroto and Seligman (1975) made this similarity between locus of control and helplessness even more obvious when they concluded that the construct of learned helplessness may exist, or be induced, as a trait. In other words, it can display a generality or stability across situations.

Other research has more directly explored the connection between various measures of affect (i.e., depression/happiness, positive/negative mood) and the internal/external control construct. For example, Kilpatrick, Dubin, and Marcotte (1974) found that subjects with an external locus of control scored significantly higher on indicators of negative affect (tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia, and confusion-bewilderment) as measured by the Profile of Mood States Scale (McNair, Lorr, & Droppleman, 1971).

Warehime and Woodson (1971) found similar correlations between internal locus of control and positive affect, using the Personal Feeling Scales (Wessman & Ricks, 1966) as their measure of affect. Correlations have also been demonstrated between internality and happiness in elderly subjects, using both self-ratings and nurses' ratings of affect (Reid, Haas, & Hawkings, 1977). Still further evidence of this locus of control-affect relationship can be seen in the work of Wolk (1976), and Palmore and Luikart (1972). See Lefcourt (1980), and Reid and Zeigler (1981) for brief reviews of this literature.

It seems clear, then, that there is a relationship between an individual's perceived control of reinforcement and his/her affective state. Generally, positive affect is associated with a belief in the dependence of reinforcement upon one's own behaviour (internality), while the perception of independence between one's behaviors and his/her reinforcement (externality) is more closely associated with negative affect.

All of the aforementioned research has specifically focused on the identification of this perceived-control/affect relationship and, with the use of a variety of paradigms, has done so quite effectively. The purpose of the present study was to identify the process by which this control/affect relationship occurs.

In order to explicate such a process, the first thing which must be determined is the direction of the perceived-

control/affect relationship. Although much of the research with the locus of control construct, specifically, has been correlational, other works which have been more experimental in nature have clearly demonstrated unidirectional, causal relationships. For example, both Langer (Langer & Rodin, 1976; Rodin & Langer, 1977) and Schulz (1976) demonstrated that the induction of perceived control caused increases in measures of positive affect relative to subjects in whom a perception of no-control had been induced. As well, studies on learned helplessness have demonstrated that the induced perception of independence between behavior and reinforcement (no-control) causes increases in measures of negative affect (Miller & Seligman, 1973; Miller & Seligman, 1975; Gatchel, Paulus & Maples, 1975). The evidence clearly suggests, therefore, that the two factors (perceived control and affect) do not merely co-vary, but that perception of control has a causal impact on the positive or negative valence of an individual's mood.

Mediating Variables

In attempting to identify the process underlying the perceived-control/affect relationship, the interrelationships among several other variables must first be examined. Specifically, the variables which will be discussed are perception of problem difficulty, perseverance, and success.

Perception of problem difficulty. Bowers (1968), and Staub, Tursky, and Schwartz (1971) found that people who believed themselves to be in control in a given situation, perceived various levels of shock as less severe or uncomfortable than did those in whom a belief in external control had been induced. The question addressed in the present study is whether this perceptual difference can also be seen with respect to problem-solving tasks. It is hypothesized that subjects scoring high on externality will rate the tasks in a problem-solving situation as significantly more difficult than will internal subjects.

Perseverance. Theoretically, the notion of learned helplessness (Overmier & Seligman, 1967; Seligman & Maier, 1967; Garber & Seligman, 1980) would predict that a subject, who has learned that responding and reinforcement are independent, will cease to exert an effort to respond. In other words, when faced with a problem, a person with an external perception of control will not persevere in attempts to solve it. This is because the external or 'helpless' individual, as a result of past experience, believes such efforts to be futile. The internal or non-helpless individual, on the other hand, has not learned this lesson about the uselessness of responding, and should therefore persevere with the full expectation of succeeding.

Vroom (1972) and Broedling (1975), in their formulations of expectancy theory, make a similar prediction. This theory postulates that one of the strongest determinants of effort exerted at one's job, is the expectancy that the attainment of desired rewards is directly dependent upon such effort. In other words, if an individual believes that the reinforcements he/she receives are contingent on his/her own actions (internal perception of control), that individual will try harder to obtain those rewards than would one who holds more of a belief in non-contingency (external perception of control). This is consistent with the previous predictions.

Another theoretical notion which is relevant to the arguments being made here is that of self-reinforcement behavior. This can be seen as the tendency for a person to reinforce his/her own behavior (either externally with tangible rewards or internally with self-praise or enjoyment of a task itself for example) in the absence of external reinforcement. Kozma and Easterbrook (1974), and Kozma and Kerwin (1975) demonstrated that the base rate at which individuals engage in self-reinforcement affects the way in which they respond to external reinforcement. In other words, the effects of situational factors (i.e., external reinforcement) are greatly determined by a more stable factor which the individual brings to the situation (i.e., baseline rate of self-reinforcement).

Conceptually, internal locus of control and self-reinforcement base rate are similar. With either greater

internality or higher base rates of self-reinforcement, the individual's behavior is guided by internal beliefs regarding the accuracy, appropriateness, or utility of that behavior. Such behavior is relatively unaffected by the actual reinforcement which is received or not received from external sources. In a problem-solving situation, it would therefore be predicted that an individual who is a high self-reinforcer would persevere throughout a greater number of externally-unreinforced trials than would a low self-reinforcer. If the conceptual similarity between locus of control and self-reinforcement is valid, then greater internality of control should lead to greater perseverance in problem-solving attempts. Presumably the trials which are not reinforced by situational factors (i.e., success) are being reinforced, nonetheless, by one's internal beliefs.

These conclusions are further supported by the work of Switzky and Haywood (1974). Here the term **intrinsically motivated** is used to refer to individuals whose behavior is more strongly affected by task-intrinsic factors (i.e., challenge, creativity, or the chance to learn new things) than it is by external reinforcement. **Extrinsically motivated** individuals are those whose behavior is primarily determined by external reinforcers such as comfort, security, ease, or financial gain. In other words, intrinsically motivated individuals generally have a high base rate of self-

reinforcement, while those who are extrinsically motivated display much less of this phenomenon.

Switzky and Haywood (1974) found that intrinsically motivated children, when performing a task which was not externally reinforced, showed greater perseverance than those who were extrinsically motivated. Once again we should recognize the conceptual similarity between locus of control and self-reinforcement tendencies which is outlined above. Based on this argument, we must again conclude that an individual with an internal locus of control (intrinsically motivated) would display greater perseverance in unreinforced problem-solving trials than would one with an external locus of control (extrinsically motivated).

In summary, these models (learned helplessness, expectancy, and self-reinforcement), converge on the notion that a person with an internal locus of control, when faced with a problem to solve or a task to perform, will exhibit greater perseverance in attempting to achieve success than will one who holds an external belief.

It is the judgement regarding problem difficulty (discussed above) which is hypothesized to mediate this relationship between perception of control and perseverance. In other words it is expected that an internal locus of control will cause an individual to perceive a given problem as less difficult to solve. This perception will in turn lead to greater perseverance when attempting to solve the problem.

Success. It is reasonable to assume that increased perseverance at a given task will increase the chance of success. If the task is such that it requires a great amount of practice, then perseverance will provide for that. Even if the task is actually void of a skill or practice component (i.e., requires luck or trial and error), then probability would still predict that a greater number of trials would yield a greater likelihood of success.

If the predictions regarding the effects of (a) perceived control upon perceived problem difficulty, (b) perceived difficulty upon perseverance, and (c) perseverance upon success are valid, then we should expect to see the manifestations of the process in the outcomes obtained by internal versus external subjects. In other words, there should be empirical evidence which demonstrates that those perceiving internal control, as opposed to external, attain greater successes in a variety of tasks or problem solving ventures. In fact, differences in performance between experimentally-induced external and internal control subjects have been demonstrated in the solution of anagrams (Gatchel & Procter, 1976), and proofreading written passages for errors (Mills & Krantz, 1979; Glass, Singer, & Friedman, 1969; Glass, Reim, & Singer, 1971 - although methodological concerns necessitate cautious interpretation of this latter study). Subjects perceiving internal control performed better than those in whom an

external belief had been induced. Locus of control has also been found to be correlated with grade average and various achievement and intelligence test scores (McGhee & Crandall, 1968; Crandall, Katkovsky, & Preston, 1962; Crandall, Katkovsky, & Crandall, 1965).

Success and affect. Level of success, as produced by the series of variables presented above (perceived control, perceived difficulty, and perseverance) is proposed as having a direct impact on an individual's affective state. Specifically, greater success will produce increased positive affect. This is the last proposed mediating step in the control/affect relationship.

Further Evidence Considered

One additional piece of research, which seems to support the present model is that of Naditch, Gargan, and Michael (1975). In that study, a multiple regression analysis was conducted to examine the interrelationships of a number of variables. Among them were locus of control (Rotter, 1966), depression as measured by a subscale of the Cornell Medical Index (Brodman, Erdmann, Lorge, Gershenson, & Wolff, 1952; Brodman, Erdmann, Lorge, & Wolf, 1949), and discontent with

one's achievements in reference to one's aspirations, as measured by the Cantril Self-Anchoring Striving Scale (Cantril, 1965).

Naditch et al. found several relationships which are relevant here. Depression and external locus of control were significantly related, as were discontent and external locus of control. The relationship between depression and the control variable has already been discussed. The fact that discontent and externality are correlated suggests several possibilities. One obvious explanation is that internals and externals set their aspirations at different levels, in such a way that creates greater achievement/goal disparity for externals than for internals. However, Lao (1970) found that the highest aspirations, regarding academic or professional future, were held by those people possessing a greater sense of personal control. In other words, internals tend to set higher goals than externals, thereby increasing the chance of discontent in themselves. This should lead to a finding which is the opposite of to that of Naditch et al.

Since the disparity between an external's aspirations and attainments is obviously not due to the goals being set disproportionately high, then it is possible that the individual's level of perseverance and success at attaining those goals is disproportionately low. This is exactly what the present model would predict. A person with an external locus of

control, when working toward some desired goal, gives up too easily, or too soon, because he/she perceives the goal as being too hard to attain. In not persevering (as long as an internal for instance), he/she seriously limits the number of successes obtained, or the number of aspirations realized. On these grounds, it is inevitable that the person with an external locus of control should experience greater discontent between aspirations and achievements, than would one displaying internality. This discontent is merely a single aspect of the negative affect brought about by the causal chain between external locus of control, perception of problem difficulty, unwillingness to continue efforts, and the small proportion of successes attained. Naditch et al. (1975) also reported that discontent was only related to depression when in the presence of an external locus of control.

The Question

The purpose of the present study is to identify the underlying causal process in the perceived-control/affect relationship. The model being proposed consists of four consecutive causal relationships (See Figure 1). First, when faced with a problem to solve or a task to perform, a person possessing an internal locus of control will perceive the problem as less difficult to solve than would one perceiving external control. Second, the less difficult a subject

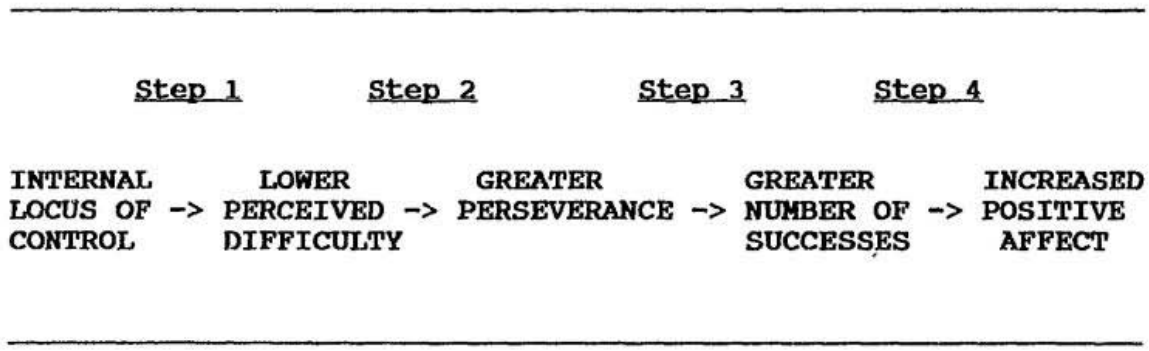

FIGURE 1

Proposed causal model of the perceived-control/affect relationship.

perceives a problem to be, the more that person will persevere in his/her attempts to solve it. Third, greater perseverance will elicit greater success. The final part of this postulate is that the individual's level of success, as a consequence of the aforementioned processes, will accurately predict mood or affective state. Specifically, greater success will produce more positive change in affect.

Method

Subjects

Subjects in this study were 121 undergraduate student volunteers (54 male and 67 female). Subjects were paid $4.25 for their participation.

Materials

Locus of control was measured by Rotter's I-E scale (Rotter, 1966; See Appendix A). Stable affect was measured using the Memorial University of Newfoundland Scale of Happiness (MUNSH; Kozma & Stones, 1980; See Appendix B), which has been demonstrated to be a reliable measure of psychological well-being. A set of eight Porteus mazes (Porteus, 1955) was used in a computer program specifically designed for this study[1] to assess perception of problem difficulty, perseverance, and success attained. This program is described in more detail in the procedure section. Change in net affect was measured using the Memorial University Mood Scale (MUMS; McNeil, 1986; See Appendix C). The MUMS has been found to

---

[1] This program was designed by the experimenter and written by Avery Earle of the Psychology Department at Memorial University of Newfoundland.

obtain a Cronbach Alpha equal to .8 for internal consistency, while temporal stability reached .5 over three days and .3 over two years (Kozma, Stone, Stones, & Hannah, 1990). It is worth noting that these low reliability scores are to be expected since the construct being measured (mood) is unstable by definition.

Procedure

Potential subjects were approached during class time, and asked to fill out the two questionnaires (locus of control - Rotter, 1966 and the MUNSH - Kozma & Stones, 1980). They were clearly informed that the task had nothing to do with the course requirements, and that the choice of whether to participate or not was therefore entirely their own. When the questionnaires were completed, but before the forms were collected, the students were informed that there was another part of the research project for which subjects were needed. A brief explanation of the subsequent study was given, outlining the fact that subjects would be required to try out a new computer program which involved attempting to solve mazes. Each person who was willing to participate was asked to write his/her name and telephone number on the back of the set of questionnaires before passing it back in, so that he/she could be contacted to arrange an appointment.

Upon arriving for an appointment, each subject was directed to a computer which was already set to run the program. He/she was told that the program provided instructions which should be self-explanatory but that the experimenter would also answer any questions. After entering his/her name, student number (for file creation purposes), gender, and amount of previous computer usage (never, 1-20 times, or >20 times), a series of instructions appeared on the screen (See Appendix D).

Subjects responded to the 23 adjectives of the MUMS (Memorial University Mood Scale) both at the beginning and end of the program, by indicating on a five point scale the extent to which each word described their current state.

After the first mood measure had been completed, the subject was presented another series of instructions (See Appendix E). A practice maze then appeared, which they could use to become familiar with the keyboard and with the rules of the maze-solution task. Any questions raised before or during a subject's practice session, regarding the instructions or the operation of the program, were answered by the experimenter, although questions were very infrequent. When a subject felt he/she had practiced enough, a press of the return button ended this segment and began the main part of the study.

Throughout the program, each time a subject was about to begin a new maze, it appeared on the screen for a period of 3 seconds. He/she was then asked to rate the difficulty of that maze on a 10 point scale (extremely easy to solve - not

solvable). When a response had been entered, the maze reappeared for the subject to attempt.

The operating rules of the program were straight forward. If the subject tried to backtrack with the cursor, if the cursor ran into a wall of the maze, or if the cursor remained stationary for a period of 2 seconds, then it was automatically sent back to the starting point, forcing the subject to begin another trial. If it remained stationary for 2 seconds at the starting point itself, then the entire maze was erased from the monitor and a warning message appeared for 10 seconds which reminded the subject to keep the cursor moving. The main purpose to these rigid time constrictions was to prevent the subject from staring at and visually solving the mazes.

To leave one maze and begin another, a subject had two options. He/she could either solve it, or quit it by pressing the return button on the keyboard, both of which automatically presented the next maze. A reminder of the procedure for quitting a maze was constantly displayed on the monitor.

After a subject had reached the last of the mazes and had responded to the second mood measure, he/she was informed by a final message on the monitor (See Appendix F) that the results and purpose of the study would be explained in a later class, after the research was complete.

Results

Overview

The results will be presented and discussed according to the consecutive steps in the proposed causal path (i.e., Step 1 = predictors of perceived difficulty; Step 2 = predictors of perseverance; Step 3 = predictors of success; Step 4 = predictors of change in affect).

As hypothesized, locus of control was found to be the best, and in fact the only predictor of perceived problem difficulty. After running some additional subjects with a set of mazes designed to test the validity of the perseverance measure, support was found for the second and third hypotheses. Perceived difficulty significantly predicted perseverance, which in turn was predictive of success. Finally, the last step of the model also received support, in that change in mood was the result of the level of success attained.

Operational Definitions

As described, the locus of control measure (Rotter, 1966), was obtained before the main testing situation, as was a measure of happiness (Kozma & Stones, 1980). This latter measure was included simply to demonstrate the direct perceived control/affect relationship which has been discussed throughout

the present paper, and was not included in further analyses. The rationale behind this omission is presented in the Summary and Conclusions section.

The perceived difficulty of each maze was rated on a scale of 1-10. For each subject, these ratings were summed over all mazes, to obtain a single perceived difficulty score. It was hypothesized that this difficulty score would correlate positively with locus of control (scored in the external direction), such that externals would rate the mazes as more difficult than internals.

The measure of perseverance took two forms. As a first measure, the program recorded for each subject, the total time spent working on the set of mazes. This was measured from the beginning of the first test maze to the point when the subject either completed or quit the last of the eight mazes, excluding the time spent rating difficulty, or reading warning messages for keeping the cursor stationary. As a second measure, the program recorded the total number of trials attempted across the whole set of mazes. Because of the time limits incorporated into the program itself, it was expected that the measure of total time spent, would correlate quite highly with that of number of trials taken. It was hypothesized that each of these measures would be negatively related to difficulty ratings such that the less difficult subjects perceived the mazes to be, the greater perseverance they would exhibit.

The computer program recorded the number of mazes which a

subject gave up on, as well as the number which he/she successfully completed. It was hypothesized that the number of successes would be accurately predicted by a positive relationship with each of the two measures of perseverance. That is, greater perseverance (time or trials) would yield greater success (more mazes solved).

Mood, as mentioned earlier, was assessed using the subjects' responses to the MUMS (McNeil, 1986), at the beginning and end of the computer testing procedure. For each of these measures, a subject's net affect was determined by subtracting negative affect from positive affect. It was hypothesized that mood change (mood at time 2 minus mood at time 1) would be accurately predicted by a positive relationship with the number of successes attained. Greater success should yield more positive affect.

Sample

With respect to locus of control, a t-test was conducted to see if the individuals who participated in the entire study differed from those who filled out the questionnaires in class (nearly all class members), but did not volunteer for the main task. There was no significant difference between the groups with regard to this variable ($t(334) = .791$, $p = .43$). As well, the distribution of locus of control scores for the actual experimental sample was relatively normal (Table 1).

Table 1

Descriptive statistics for major variables.

	Mean	Standard Deviation	Range Minimum	Range Maximum
CONTROL	10.71	4.1	1	19
MUNSH	10.47	8.4	-16	24
DIFFICULTY	46.14	12.1	14	78
TRIALS	71.7	68.3	27	463
TIME	13.68 (13:41)	5.87 (5:52)	6.00	42.00
SUCCESS	7.26	1.33	0	8
MOOD1	17.78	9.79	-8	33
MOOD2	19.13	9.16	-9	33
MOOD CHANGE	1.35	8.36	-27	27

Note:

CONTROL = locus of control (total external responses)

MUNSH = total score on the MUNSH (pos. - neg.)

DIFFICULTY = difficulty ratings totalled over all mazes

TRIALS = total number of trials taken on all mazes

TIME = total time spent on all mazes

SUCCESS = number of mazes solved

MOOD1 = mood at time 1 (pos. affect - neg. affect)

MOOD2 = mood at time 2 (pos. affect - neg. affect)

MOOD CHANGE = change from mood1 to mood2 (mood2 - mood1)

In terms of computer usage, 8 subjects indicated never having used one before, 72 reported having had 1-20 previous encounters, and 41 claimed to be frequent users (more than 20 times).

Analyses

It should first be noted that the direct relationship between perceived control and stable affect (discussed throughout the present paper) was observed in a significant correlation between subjects' scores on the locus of control scale and the MUNSH ($r = -.316$, $p < .0005$)[1]. The negative relationship indicates that internal locus of control is associated with greater happiness. (As mentioned previously, the MUNSH was not included in further analyses. The reasons for this decision are discussed in the Summary and Conclusions section.)

First order correlations were calculated between all major variables in the proposed model, and are reported in Table 2. In order to identify the best direct predictors of the dependent variables at each step in the model, partial correlations were conducted, using multiple regression analyses. The procedures followed were those of a path

---

[1] Since mood change from time 1 to time 2 was the variable of interest in the present model, the stable component of affect which is measured by the MUNSH was not included in further analyses. This will be re-addressed in the discussion section.

Table 2

First order correlations between all major variables.

	CONTROL	DIFF.	TRIALS	TIME	SUCCESS	MOOD	USAGE
DIFF.	.187*						
TRIALS	.120	.176					
TIME	.147	.148	.674*				
SUCCESS	-.147	-.281*	-.635*	-.295*			
MOOD	-.083	-.153	-.127	-.168	.295*		
USAGE	-.030	-.139	-.184*	-.185*	.263*	.182*	
SEX	-.068	.017	.180*	.318*	-.234*	-.069	-.095

Note:

CONTROL = locus of control (total external responses)

DIFF. = difficulty ratings totalled over all eight mazes

TRIALS = total number of trials taken over all mazes

TIME = total time spent on all mazes

SUCCESS = number of mazes solved

MOOD = mood change from time 1 to time 2 (time 2 - time 1)

USAGE = amount of previous computer usage

SEX = coded as males = 0, females = 1

* = statistical significance; $p < .05$ (or better)

analyses. That is, for each step of the model, only those variables which attained significant first order correlations with the dependent variable in question, and of course preceded it chronologically, were included in the regression analysis.

Step 1. It was hypothesized that locus of control, which was scored in the external direction, would correlate positively with the sum of the subject's 8 ratings of maze difficulty. This relationship did emerge ($r = .187$, $p < .05$). In fact, locus of control was the only significant predictor of difficulty ratings (see Table 2). The data for this first step, therefore, supports the proposed model. That is, the more external a subject's locus of control score was, the more difficult he/she perceived the mazes to be.

Step 2. It was hypothesized that perceived difficulty would be the best predictor of perseverance and that this would be a negative relationship.

The two measures of perseverance used were the subject's total number of trials taken and total amount of time spent over the full set of mazes. As expected, these two were highly correlated with each other ($r = .674$, $p < .0001$).

Difficulty ratings, which were expected to correlate negatively with these measures (low perceived difficulty = high perseverance), were marginally correlated with number of trials, but in the positive direction ($r = .176$, $p = .0532$).

Two other variables were related to the perseverance measures. Amount of previous computer usage was significantly related to both trials taken ($r = -.184$, $p < .05$), and time spent ($r = -.185$, $p < .05$). The negative correlation indicates that greater previous experience led to less time and fewer trials. Sex was also related to both trials ($r = .180$, $p < .05$), and time ($r = .318$, $p < .0005$), such that females spent more time and took more trials than did males.

Since sex and computer usage were the only two significant predictors of time spent on the mazes, it is obvious that the data from this particular variable do not fit the proposed model. The same may be said for number of trials, since the correlation between difficulty scores and number of trials was in the opposite direction to that which was predicted. Nonetheless, partial correlations were calculated for these variables.

With difficulty ratings, computer usage, and sex as independent variables and trials as the dependent variable, the partial correlations were $r = .043$ (n.s.), $r = .039$ (n.s.), and $r = .050$ (n.s.), respectively. When partial correlations of both computer usage and sex, with time, were calculated, only the effect of sex remained significant ($r = .302$, $p < .001$), while the effect of computer usage ($r = .155$, n.s.) was non-significant. Sex, then, was the strongest predictor of the amount of time spent working on the mazes, indicating that females spent more time than males.

A closer examination of the results from this step and from step 3 below suggested a possible problem with the construct validity of the perseverance measures. This notion, and the steps which were taken to test it, are discussed in more detail in a later section.

Step 3. Perseverance (number of trials taken or total time spent) was hypothesized to be the best predictor of number of mazes solved, and this relationship was expected to be a positive one.

Several variables were found to be first order predictors of the number of mazes solved. Each of the perseverance measures correlated significantly with success, but in the opposite direction to that which was hypothesized. Success related to trials taken ($r = -.635$, $p < .0001$) and to time spent ($r = -.295$, $p < .001$), such that the fewer trials taken or the less time spent the more mazes solved. Difficulty ratings were also predictive of success ($r = -.281$, $p < .002$). Specifically, the more difficult a subject perceived the mazes to be, the fewer mazes he/she solved. Previous computer usage significantly correlated with success ($r = .263$, $p < .004$), in that more experience led to more mazes solved. Sex was also found to be related to success ($r = -.234$, $p < .01$) indicating that males solved more mazes than females.

In sum then, the variables which showed significant first order correlations with the success measure were trials, time, perceived difficulty, computer usage, and sex. With trials and time being so strongly related to each other, the two were not included in this regression equation together. That is, the analysis was performed twice, once using trials as the perseverance measure and once using time.

When trials, difficulty ratings, computer usage, and sex were included as predictors of success, and partial correlations were calculated, the only significant relationship with success was that of trials taken (r = .538, p < .0001), while difficulty ratings (r = .158, n.s.), computer usage (r = .123, n.s.), and sex (r = .114, n.s.) showed little predictive ability. However, this negative relationship between trials and success is in the opposite direction to that which was predicted, indicating that the greater the number of trials taken, the smaller the number of mazes successfully solved.

When time spent was included in this same equation, in place of trials taken, the only two significant partial correlations were between difficulty ratings and success (r = .224, p < .02), as well as between computer usage and success (r = .179, p = .05). Time spent (r = .164, n.s.), and sex (r = .149, n.s.) did not significantly predict number of mazes solved. Based on this analysis, the best predictor of success was difficulty ratings. Since this was a negative relationship (see Table 2), it is clearly in the direction that

would be expected on the basis of the current model (greater perceived difficulty associated with less success). However, mediating effects of perseverance were hypothesized rather than the direct difficulty-success relationship which was observed (See Figure 1).

As noted in step 2 above, these unexpected findings were interpreted as being the result of invalid measures of perseverance. This is discussed in detail in a later section.

Step 4. The hypothesis posed for the final step of the model was that number of mazes solved would be the best direct predictor of mood change, and that this relationship would be a positive one.

Only two of the relevant variables correlated significantly with mood change. First, success was predictive of this measure ($r = .295$, $p < .001$) in the hypothesized direction. That is the greater the number of mazes solved, the more positive was the change in affect from time 1 to time 2.

Second, amount of previous computer usage was related to subjects' change in mood ($r = .182$, $p < .05$) indicating that greater previous experience led to greater positive mood change.

Success and computer usage were both included in a regression analysis as independent variables with mood change as the dependent variable. When partial correlations were

calculated, success continued to predict mood change (r = .256, p < .005), while computer usage no longer accounted for a significant amount of the variance in this measure of affect (r = .104, n.s.).

The data clearly support the hypothesis for this step in the model. The more mazes a subject solved, the more positive the change in mood he/she experienced.

Questions of Construct Validity

An examination of the way in which time and trials relate to the other variables indicated that something other than perseverance may have been measured. The first order correlations, and one of the partial correlations reported above, indicate highly significant negative relationships between these variables and success. In other words, those subjects who solved the most mazes spent less time and executed fewer trials than those who solved the fewest mazes. There was clearly some type of skill or intelligence factor operating which allowed some subjects to solve the mazes too quickly for any perseverance behavior to be even relevant, let alone necessary. Steps taken to clarify this issue are described in the following section. Due to temporal and financial constraints, only those variables directly relevant to the construct problems at hand were included in this further investigation.

Procedure

A second group of 56 subjects was tested on a maze program which was similar to that described above, but was designed specifically to test the validity of the perseverance construct. An entirely new set of six mazes was designed, one of which was deliberately made to be insolvable, though not apparently so. Performance on this maze was considered to be a

more accurate reflection of perseverance because it could not be as easily affected by skill or other success-related variables.

One further, less severe problem seemed to exist in the initial measure of success. Specifically, so many of the original group of subjects solved all eight of the mazes (79/121), that the distribution was severely skewed with very low variance (mean = 7.26; median = 8; sd. = 1.33; skew = -2.49). This, of course, seriously impedes the predictive ability of this variable. In an attempt to remedy this situation, the 5 solvable mazes used in this validation effort were made considerably more complex than those used in the main study. It was hoped that this would increase the variance in the success measure, thereby also increasing the mood-predicting ability of this variable.

With the exception of replacing the original eight mazes with the six described above, the operations of this modified program were the same as in the main study.

Results

Perseverance. As expected, the results obtained by this more rigorous instrument do indicate that a construct problem existed in the original perseverance measures. First, when each subject's difficulty rating for the insolvable maze itself was correlated with the amount of time he/she spent working on that

maze, a highly significant relationship emerged (r = -.518, p < .0001). The more difficult a subject perceived the maze to be, the less time he/she spent working at it. Since the two perseverance measures (time spent and trials taken) were highly intercorrelated (r = .565, p < .0001), it was expected that number of trials would also be predicted by difficulty ratings. Although this difficulty/trials relationship did not attain significance (r = -.200, n.s.), it was in the predicted direction, contrary to that found in the main study.

Second, when perseverance served as the independent variable, a significant correlation was found between time spent working on the insolvable maze, and number of mazes solved (r = .287, p < .04). This relationship was also in the predicted direction, in that greater perseverance on the insolvable maze was related to greater success on all of the other mazes. The number of trials taken on the insolvable maze exhibited no relationship with the number of mazes solved (r = .003, n.s.). However, in terms of construct validation, it must be noted that this is in sharp contrast to the negative relationship found originally (r = -.635, p < .0001). In other words, even though the use of this alternative perseverance measure did not show a positive relationship between these variables, removal of the confounds of skill-related factors did completely eliminate the original negative correlation.

Success Distribution. It was proposed that the greater complexity of the five solvable mazes in this program (as compared with the eight used in the main study) would decrease the number of subjects who attained perfect success. The increased variance resulting from fewer subjects solving all mazes, was expected to improve the affect-predicting ability of the success variable.

This is, in fact what happened. The distribution, while still not normal, was changed considerably (mean = 3.80; median = 4.5; sd. = 1.54; skew = −1.02), such that 50% of the 56 subjects solved all mazes, as compared to 65.3% reported above for the main study. The correlation between success and mood change increased from .255 to .342 as a result of this increased variance in the success measure.

Discussion

The purpose of this study was to test a model of a causal path between perceived control and affect (Figure 1). The model proposed consisted of four consecutive causal links, each of which were individually analyzed and found to be supported by the data. Taken in total, then, these four causal links provide support for the overall model.

Hypothesis 1

It was hypothesized that internal locus of control would be associated with lower perceived problem difficulty. The data produced a significant correlation in the predicted direction, with no competing significant predictors. Although this correlation was relatively small, it could very easily have been weakened by experiential factors. That is, while subjects' previous computer usage was taken into account, their experience with video games or with solving mazes on paper could have had differential effects on the perceptions of internals versus externals. It can nonetheless be concluded that the first hypothesized causal link was confirmed. The more control a subject perceived him/herself as having, the less difficult he/she perceived a problem-solving task to be. The findings of Bowers (1968) and Staub, Tursky, and Schwartz (1971) (regarding the perception of electrical shock) therefore do seem to generalize to this problem-solving paradigm.

Hypothesis 2

In the second stage of the proposed model, it was hypothesized that lower perceived problem difficulty would be associated with greater perseverance. This postulate received no support from the original data. In fact, the relationship which did exist was in the opposite direction to that which was predicted. However the measures used for perseverance, appear to have contained a serious validity problem. They seem to have measured some type of intelligence/skill-related construct rather than perseverance. As hypothesized, when this problem was corrected a very strong and highly significant relationship emerged which was also in the predicted direction.

Support was also obtained, therefore, for the second hypothesized causal link. The less difficult the subjects perceived the problem to be, the longer they were willing to persevere in their attempts to solve it.

Hypothesis 3

It was hypothesized that greater perseverance would be associated with greater success. Unfortunately, the construct problem with the initial perseverance measure, described above, also confused results at this third stage of the model. The original data once again indicated relationships in the opposite direction to that which was predicted. Specifically,

those subjects who solved the most mazes, spent the least time and fewest trials doing so.

When a more valid measure of perseverance was employed this problem was rectified. The negative relationship between trials and success, which was hypothesized as being the result of skill/success-related variables, disappeared when success was controlled for in this measure of perseverance. Similarly, the negative relationship originally found between time and success not only disappeared when the confound was controlled, but emerged as a significant positive relationship. This seems even more substantial when the fact is taken into account that the measure of perseverance and the measure of success were obtained from completely different mazes. That is, the more time spent working on the insolvable maze, the more of the other mazes the subject actually solved. It is likely that this relationship would be even stronger if the measures of perseverance and success were obtained from the same task, while still controlling the confounds identified here.

In sum, the data, when taken together, provide support for this particular link in the causal chain. That is, the more a subject persevered at problem-solving tasks such as maze-completion, the more success he/she attained.

Hypothesis 4

It was hypothesized that greater success would be associated with greater positive change in affect. At this particular step in the model, though usage and success both obtained significant first order correlations with mood change, partial correlations indicated that the only significant predictor of this change in affect was the number of mazes solved. Since this was a positive relationship, it indicates that higher levels of success caused more positive mood. It is therefore concluded that the data support this stage of the proposed model. Clearly the subjects who solved the greatest number of mazes, experienced the greatest positive change in net affect as a direct result of that success.

Summary and Conclusions

Support was found for each of the four steps in the proposed model (Figure 2). Subjects who expressed the most internal beliefs regarding control of reinforcement perceived the problems which they faced to be less difficult than did subjects with more external control beliefs. In turn, those who perceived the problems to be the least difficult, demonstrated the greatest amount of perseverance in their solution attempts. Those individuals who persevered the most attained the greatest success as a result of this behavior. Finally, greater success was associated with greater positive increase in his/her net affect.

The proposed model does therefore appear to be a valid representation of an existing process. However, post-hoc analyses have raised questions regarding the interpretation of these results. As previously noted, locus of control correlated significantly with scores on the MUNSH ($r = -.316$, $p < .0005$), which is a measure of the stable, trait-like component of affect (Kozma & Stones, 1980). However, when scores on the MUMS at time 1 (before beginning to work on the experimental stimuli) were examined, no such significant relationship with locus of control emerged ($r = -.143$, n.s.), even though scores on the MUNSH and the MUMS were highly intercorrelated ($r = .506$, $p < .0001$).

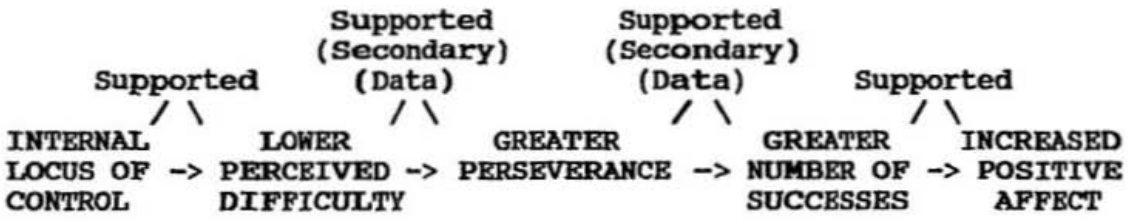

FIGURE 2

Findings for each step in the proposed causal model of the perceived-control/affect relationship.

Based on these observations, and on the distinction between stable (MUNSH) and unstable (MUMS) affect, several conclusions can be drawn regarding the results of the present study. First, the proposed model does not lend explanation to the relationship between locus of control and affect as measured by the MUNSH. With both of these measures representing stable personality constructs, neither can reasonably be expected to be directly manipulated. Assuming, as well, that the proposed stability of each construct is valid, there should be no change in either as a result of experimentally manipulating any other variables. For this reason, the MUNSH was not included in any of the analyses.

Second, the present model does not explain any pre-existing relationship between locus of control and the component of affect which is measured by the MUMS, since this direct relationship (locus of control/mood at time 1) did not initially attain statistical significance. This result is not necessarily surprising since it represents a relationship between a stable and an unstable construct. How could such factors be expected to systematically covary?

Finally, what the proposed model does clearly demonstrate is a process by which internals and externals differentially perceive and respond to certain types of environmental cues. The outcome of this process clearly impacts on the valence and magnitude of the individuals' unstable affective state, or mood.

When all evidence is compiled, there is sufficient support to conclude that perceived control can differentially predispose individuals to perceptual and behavioral patterns which directly influence their affective states. It can also be concluded that the proposed model accurately depicts the causal path by which this process occurs. There are, however, several theoretical and methodological issues which must be clarified by further research in this area. These will be addressed briefly.

First, it must be noted that although support was found for each of the steps in the proposed model, this support was divided among two groups of subjects across two separate studies. What is clearly needed to strengthen the conclusions drawn here is support for all four steps of the model within the confines of one single study.

Second, an interesting question which is currently being investigated by the experimenter (stemming from a discussion by Ross & Fletcher, 1985) regards the validity of measuring the construct of locus of control as if there is a hydraulic relationship between the internal and external dimensions. That is, perhaps the predictive validity and, hence, the utility of the construct would be enhanced by an instrument that allowed the subject to respond to both the internal and the external items, without one automatically excluding the other, as is the case in the currently accepted forced-choice paradigm.

Third, in order to demonstrate more clearly the validity of the path model proposed in the present study, a measure of perseverance must be used which meets several important criteria. It must control against the confounding effects of any skill-related factors, while still allowing for a test of the direct effects of that perseverance upon success. In the present study, inserting an insoluble maze into the program appeared to produce the valid measure of perseverance required.

Fourth, the measure of success/failure must be designed to allow for a normal distribution of scores, with sufficient variance. That is, the task must be difficult enough to prevent ceiling effects which could weaken that variable's predictive ability (i.e., the majority of the subjects attaining complete success) as was apparently the case in the present study.

Fifth, it is quite conceivable that prediction at the last stage of the proposed model would be strengthened even more if the subjects' own perceptions of their success or failure were obtained. In the present study, success was measured in absolute terms simply by the number of mazes the subject solved. It may be, however, that the crucial factor is the subject's success relative to his/her own internal standards. In this sense, a measure of the subject's rating of his/her perceived level of success, would reflect such a relative assessment, as opposed to an absolute score. In essence, the methodology in the present study assumed a single standard of success against which the moods of all subjects were predicted.

Allowing for a more relative, subjectively determined measure may add considerable strength to that variable's predictive ability.

Based on the findings of this current research, further examination of this causal path between perceived control and change in affect, should prove fruitful, especially if the aforementioned points are taken into consideration.

Locus of Control Scale (Rotter, 1966)

A subject's score is comprised of the total number of external responses (underlined below) which he/she selects. Items below which have no alternative underlined are fillers.

Select the alternative which you personally believe to be more true.

"I more strongly believe that:"

1.a. Children get into trouble because their parents punish them too much.
  b. The trouble with most children nowadays is that their parents are too easy with them.

2.a. Many of the unhappy things in people's lives are partly due to bad luck.
  b. People's misfortunes result from the mistakes they make.

3.a. One of the major reasons we have wars is because people don't take enough interest in politics.
  b. There will always be wars, no matter how hard people try to prevent them.

4.a. In the long run people get the respect they deserve in this world.
  b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5.a. The idea that teachers are unfair to students is nonsense.
  b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6.a. Without the right breaks one cannot be an effective leader.
  b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7.a. No matter how hard you try some people just don't like you.
  b. People who can't get others to like them don't understand how to get along with others.

8.a. Heredity plays a major role in determining one's personality.
  b. It is one's experiences in life which determine what they're like.

9.a. I have often found that what it going to happen will happen.
b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10.a. In the case of the well prepared student their is rarely if ever such a thing as an unfair test.
b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

11.a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
b. Getting a good job depends mainly on being in the right place at the right time.

12.a. The average citizen can have an influence in government decisions.
b. This world is run by the few people in power and there is not much the little guy can do about it.

13.a. When I make plans, I am almost certain that I can make them work.
b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14.a. There are certain people who are just no good.
b. There is some good in everybody.

15.a. In my case getting what I want has little or nothing to do with luck.
b. Many times we might just as well decide what to do by flipping a coin.

16.a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
b. Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.

17.a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
b. By taking an active part in political and social affairs the people can control world events.

18.a. Most people can't realize the extent to which their lives are controlled by accidental happenings.
b. There really is no such thing as "luck".

19.a. One should always be willing to admit his mistakes.
b. It is usually best to cover up one's mistakes.

20.a. It is hard to know whether or not a person really likes you.
b. How many friends you have depends upon how nice a person you are.

21.a. In the long run the bad things that happen to us are balanced by the good ones.
b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22.a. With enough effort we can wipe out political corruption.
b. It is difficult for people to have much control over the things politicians do in office.

23.a. Sometimes I can't understand how teachers arrive at the grades they give.
b. There is a direct connection between how hard I study and the grades I get.

24.a. A good leader expects people to decide for themselves what they should do.
b. A good leader makes it clear to every body what their jobs are.

25.a. Many times I feel that I have little influence over the things that happen to me.
b. It is impossible for me to believe that chance or luck plays an important role in my life.

26.a. People are lonely because they don't try to be friendly.
b. There's not much use in trying too hard to please people, if they like you, they like you.

27.a. There is too much emphasis on athletics in high school.
b. Team sports are an excellent way to build character.

28.a. What happens to me is my own doing.
b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29.a. Most of the time I can't understand why politicians behave the way they do.
b. In the long run the people are responsible for bad government on a national as well as on a local level.

M U N S H

Instructions: We are interested in how things are going these days. For each of the items below, circle "Yes" if the item applies to you, "No" if it does not apply to you, and "DK" if you don't know or are unsure.

In the past month have you ever felt:

1. On top of the world?	Yes	No	DK
2. In high spirits?	Yes	No	DK
3. Particularly content with your life?	Yes	No	DK
4. Lucky?	Yes	No	DK
5. Very lonely or remote from people?	Yes	No	DK
6. Bored?	Yes	No	DK
7. Depressed or very unhappy?	Yes	No	DK
8. Flustered because you didn't know what to do?	Yes	No	DK
9. Bitter about the way your life has turned out?	Yes	No	DK
10. Generally satisfied with the way your life has turned out?	Yes	No	DK

The next set of items have to do with more general life experiences. Please answer "Yes" if the statement applies to you, "No" if it does not, and "DK" if you don't know or can't tell.

11. This is the dreariest time of my life.	Yes	No	DK
12. I am just as happy as when I was younger.	Yes	No	DK
13. Most of the things I do are boring and monotonous.	Yes	No	DK
14. The things I do are as interesting as they ever were.	Yes	No	DK
15. As I look back on my life I am fairly well satisfied.	Yes	No	DK
16. Things keep getting worse as I get older.	Yes	No	DK
17. Do you often feel lonely?	Yes	No	DK
18. Little theings bother me more this year.	Yes	No	DK
19. Do you like living in this city?	Yes	No	DK
20. I sometimes feel that life isn't worth living.	Yes	No	DK
21. I am as happy now as I was when I was younger.	Yes	No	DK
22. Life is hard for me most of the time.	Yes	No	DK
23. Are you satisfied with your life today?	Yes	No	DK
24. My health is at least as good as most people's my age.	Yes	No	DK

Adjective Checklist of The Memorial University Mood Scale (MUMS)

The subscales of positive affect, negative affect, and vigour are indicated by (P), (N), and (V) respectively.

1. Active (V)
2. Activated (V)
3. Blue (N)
4. Contented (P)
5. Downhearted (N)
6. Energetic (V)
7. Enthusiastic (P)
8. Happy (P)
9. Lively (V)
10. Lonely (N)
11. Peppy (V)
12. Pleasant (P)
13. Pleased (P)
14. Strong (V)
15. Refreshed (V)
16. Vigorous (V)
17. Worried (N)
18. Angry (N)
19. Cheerful (P)
20. Sad (N)
21. Satisfied (P)
22. Grouchy (N)
23. Peaceful (P)

First Set of Computer Instructions

The first part of this program is concerned with your description of how you are feeling. You will be presented with a series of words, one at a time. As each one appears on the screen, please indicate how accurately this word describes the way you are feeling at that moment. This can be done simply by typing a number between 1 and 5. A "1" would indicate that you are not experiencing that feeling at all, a "3" would mean that you are feeling a moderate amount of that item, and a "5" would indicate that you are experiencing a great amount of that feeling.

When you have completed this list, the instructions for the next part of the program will begin.

If you are now ready to begin, please press the "RETURN" key on the right hand side of the keyboard.

Second Set of Computer Instructions

Thank you for your cooperation on that first task. This is a newly designed program, which allows the user to attempt to solve a set of mazes, one at a time. The object is to move the cursor (the flashing red dot) from the starting point " S ", through the maze, and out through the opening which is marked with an " F ", as quickly as possible. You can do this by using the "ARROW" keys on the right hand side of the keyboard, which will move the cursor up, down, left, or right, respectively.

To read the rules of the program,
please press "RETURN"...

RULES

There are three things which will cause the computer to automatically send the cursor back to the "Start" of the maze you are working on. These are:

(1) if you try to "back up" or go over a path that you have already taken.

(2) if you try to go through one of the walls of the maze.

(3) if you let the cursor remain still for 2 seconds

-----PRESS "RETURN" FOR MORE-------

RULES (cont'd)

Each time you manage to solve a particular maze, the act of moving the cursor through the "Finish" opening will erase the current maze and present the next one for you to attempt.

If, however, after attempting a particular maze for a number of trials, you feel you would like to give up on that one and move on to the next maze instead, simply press the "RETURN" key, and the next maze will appear.

-----PRESS "RETURN" FOR MORE-------

RATING MAZE DIFFICULTY

Each time a new maze appears for the first time, you will be given a 3 second viewing, after which you will be asked to rate how difficult you honestly believe that maze will be to solve. This can be done by simply typing a number from 1 to 10, where a "1" is "extremely easy to solve", and a "10" is "not solvable". You will see exactly how this works, in a moment, when you begin your practice session.

------Press "RETURN" To Continue------

Please do not be concerned by the fact that other subjects will be finishing before or after you. This certainly does not indicate that you are performing better or worse than them. In fact, the amount of time that a subject takes to complete the task is the result of many different factors. That is, it depends on how many times he/she is willing to attempt a certain maze, how many of the mazes an individual gives up on, how long it takes each person to rate the difficulty of each maze, how long it takes he/she to answer the questions which are asked. So please keep in mind that the time others take to finish, does not indicate anything, and should therefore be ignored.

*** PRESS "RETURN" TO CONTINUE ***

PRACTICE SESSION

For the practice session, you may take as many trials as you wish in order to become familiar with the "Arrow" keys, and with the rules of the program.

These practice trials are different from the 'real' mazes in one way. That is, during these practice trials only, even if you solve the maze, the same practice maze will continue to appear. When you feel you have had enough practice and are familiar with the program and the way the "Arrow" keys operate, simply press "RETURN" and the first 'real' maze will begin.

-----PRESS "RETURN" TO CONTINUE-----

When you are ready to begin, press the "RETURN" key and a practice maze will appear on the screen. Remember that it will appear for only 3 seconds, after which you will be asked to rate its difficulty. When you have responded, the maze will appear again, so that you can use it to practice on.

QUESTIONS

If there is anything in what you have read that you do not understand, or if you have any questions at all regarding the program, please feel free to ask the experimenter now or at any time during the practice session.

----PRESS "RETURN" TO BEGIN----
-----THE PRACTICE SESSION------

Thank you for your participation thus far. The next step in this program is for you to respond to the same list of words which you were presented with earlier. Remember, they will appear one at a time, and your task is to indicate the extent to which each of the words describes the way you are feeling at that time. You can do this simply by pressing a number from 1 to 5. For example, "1" means that you are not experiencing that feeling at all, and "5" means that you are experiencing this feeling or characteristic very much. In other words :

1	2	3	4	5
DOES NOT DESCRIBE ME AT ALL RIGHT NOW		DESCRIBES MY PRESENT FEELINGS SOMEWHAT		DESCRIBES MY PRESENT FEELINGS QUITE WELL

----Press "RETURN" To Continue----

Final Set of Computer Instructions

Congratulations!
You have reached the end of the program.

Thank you for your cooperation.

The experimenter will explain the results and purpose of this research in your classroom in the near future.

It would be appreciated if you would refrain from discussing this research, or your participation in it, with any student who is scheduled as a subject but has not yet participated. This is very important because your opinions or reactions to the experience can unknowingly influence their behaviors and responses, and thereby destroy the validity of the data.

Once again I thank you for your cooperation.
Have a nice day!

References

Bowers, K.S. (1968). Pain, anxiety, and perceived control. Journal of Consulting and Clinical Psychology, 32, 596-602.

Brodman, K., Erdmann, A.J., Lorge, I., Gershenson, C., & Wolf, H.G. (1952). The Cornell Medical Index Health Questionnaire. III.The evaluation of emotional disturbances. Journal of Clinical Psychology, 8, 119-124.

Brodman, K., Erdmann, A.J., Lorge, I.,& Wolf, H.G. (1949). The Cornell Medical Index: An adjunct to medical interview. Journal of The American Medical Association, 140, 530-534.

Broedling, L.A. (1975). Relationship of internal-external control to work motivation and performance in an expectancy model. Journal of Applied Psychology, 60, 65-70.

Cantril, H. (1965). The Pattern of Human Concerns. New Brunswick, N.J.: Rutgers University Press.

Crandall, V.C., Katkovsky, W., & Crandall, V.J. (1965). Children's beliefs in their own control of reinforcements in intellectual-academic achievement situations. Child Development, 36, 91-109.

Crandall, V.J., Katkovsky, W., & Preston, A. (1962). Motivational and ability determinants of young children's intellectual achievement behaviors. Child Development, 33, 643-661.

Garber, J., & Seligman, M.E.P. (Eds.).(1980). Human Helplessness: Theory and Applications. New York, New York: Academic Press.

Gatchel, R.J., Paulus, P.B., & Maples, C.W. (1975). Learned helplessness and self-reported affect. Journal of Abnormal Psychology, 84, 732-734.

Gatchel, R.J., & Proctor, J.D. (1976). Physiological correlates of learned helplessness in man. Journal of Abnormal Psychology, 85, 27-34.

Glass, D.C., Reim, B., & Singer, J.E. (1971). Behavioral consequences of adaptation to controllable and uncontrollable noise. Journal of Experimental Social Psychology, 7, 244-257.

Glass, D.C., Singer, J.E., & Friedman, L.N. (1969). Psychic cost of adaptation to an environmental stressor. Journal of Personality and Social Psychology, 12, 200-210.

Hiroto, D.S. (1974). Locus of control and learned helplessness. Journal of Experimental Psychology, 102, 187-193.

Hiroto, D.S., & Seligman, M.E.P. (1975). Generality of learned helplessness in man. Journal of Personality and Social Psychology, 31, 311-327.

Kilpatrick, D.G., Dubin, W.R., & Marcotte, D.B. (1974). Personality, stress of the medical education process, and changes in affective mood state. Psychological Reports, 34, 1215-1223.

Kozma, A., & Easterbrook, P. (1974). Effects of baseline self-reinforcement behavior and training level on posttraining self-reinforcement behavior. Journal of Experimental Psychology, 102, 256-259.

Kozma, A. & Kerwin, S. (1975). The effects of a monetary incentive on the accuracy of post-training self-reinforcement behavior. Canadian Journal of Behavioural Science, 7, 420-428.

Kozma, A., Stone, S., Stones, M.J., & Hannah, T.E. (1990). Long- and short-term affective states in happiness: Model paradigm and experimental evidence. Social Indicators Research, In Press.

Kozma, A., & Stones, M.J. (1980). The measurement of happiness: Development of the Memorial University of Newfoundland Scale of Happiness (MUNSH). Journal of Gerontology, 35, 906-912.

Langer, E.J., & Rodin, J. (1976). The effects of choice and enhanced personal responsibility for the aged: A field experiment in an institutional setting. Journal of Personality and Social Psychology, 34, 191-198.

Lao, R.C. (1970). Internal-external control and competent and innovative behavior among negro college students. Journal of Personality and Social Psychology, 14, 263-270.

Lefcourt, H.M. (1966). Internal versus external control of reinforcement. Psychological Bulletin, 65, 206-220.

Lefcourt, H.M. (1980). Personality and Locus of Control. In Garber, J. and Seligman, M.E.P. (Eds.) Human Helplessness: Theory and Applications (pp. 245-259). New York, New York: Academic Press.

McGhee, P.E., & Crandall, V.C. (1968). Beliefs in internal-external control of reinforcements and academic performance. Child Development, 39, 91-102.

McNair, D.M., Lorr, M.,& Droppleman, L.F. (1971). Manual Profile of Mood States. San Diego: Educational and Industrial Testing Service.

McNeil, J.K. (1986). Mood, measurement, diurnal variation, and age effects. Unpublished doctoral dissertation, Memorial University of Newfoundland, St. John's.

Merriam-Webster Inc. (1984). Webster's Ninth New Collegiate Dictionary. Springfield, Mass.: Author.

Miller, W.R., & Seligman, M.E.P. (1973). Depression and the perception of reinforcement. Journal of Abnormal Psychology, 82, 62-73.

Miller, W.R., & Seligman, M.E.P. (9175). Depression and learned helplessness in man. Journal of Abnormal Psychology, 84, 228-238.

Mills, R.T., and Krantz, D.S. (1979). Information, choice, and reactions to stress: A field experiment in a blood bank with laboratory analogue. Journal of Personality and Social Psychology, 37, 608-620.

Naditch, M.P., Gargan, M.A., & Michael, L.B. (1975). Denial, anxiety, locus of control, and the discrepancy between aspirations and achievements as components of depression. Journal of Abnormal Psychology, 84, 1-9.

Overmier, J.B., & Seligman, M.E.P. (1967). Effects of inescapable shock upon subsequent escape and avoidance responding. Journal of Comparative and Physiological Psychology, 63, 28-33.

Palmore, E., & Luikart, C. (1972). Health and social factors related to life satisfaction. Journal of Health and Social Behavior, 13, 68-80.

Phares, E.J. (1957). Expectancy changes in skill and chance situations. Journal of Abnormal and Social Psychology, 54, 339-342.

Porteus, S.D. (1955). The Maze Test, Recent Advances. New York, New York: The Psychological Corporation.

Reid, D.W., Haas, G., & Hawkings, W. (1977). Locus of desired control and positive self-concept of the elderly. Journal of Gerontology, 32, 441-450.

Reid, D.W., and Ziegler, M. (1981). The desired control measure and adjustment among the elderly. In Lefcourt, H.M. (Ed.), Research With The Locus of Control Construct (Vol. 1). (pp. 127-159). New York, New York: Academic Press, Inc.

Reker, G.T. (1989). Personal meaning in life: A two component model and scale. Poster presented at the 18th annual meeting of The Canadian Association of Gerontology in Ottawa.

Rodin, J., & Langer, E.J. (1977). Long-term effects of control-relevant intervention with the institutionalized aged. Journal of Personality and Social Psychology, 35, 897-902.

Ross, M., & Fletcher, G.J.O. (1985). Attribution and Social Perception. In Lindzey, G. & Aronson, E. (Eds.), Handbook of Social Psychology, Third Edition (Vol. II). (pp. 73-122). New York: Random House.

Rotter, J.B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs: General and Applied, Vol. 80, No. 1, Whole No. 609.

Rotter, J.B. (1982). The Development and Application of Social Learning Theory. New York, New York: Praeger Publishers.

Rotter, J.B., Liverant, S., & Crowne, D.P. (1961). The growth and extinction of expectancies in chance controlled and skilled tasks. The Journal of Psychology, 52, 161-177.

Rotter, J.B., & Mulry, R.C. (1965). Internal versus external control of reinforcement and decision time. Journal of Personality and Social Psychology, 2, 598-604.

Seligman, M.E.P. (1972). Learned helplessness. Annual Review of Medicine, 23, 407-412.

Seligman, M.E.P. (1975). Helplessness: On Depression, Development, and Death. San Francisco: W.H.Freeman and Company.

Seligman, M.E.P., & Maier, S.F. (1967). Failure to escape traumatic shock. Journal of Experimental Psychology, 74, 1-9.

Schulz, R. (1976). Effects of control and predictability on the physical and psychological well-being of the institutionalized aged. Journal of Personality and Social Psychology, 33, 563-573.

Schulz, R., & Hanusa, B.H. (1978). Long-term effects of control and predictability-enhancing interventions: Findings and ethical issues. Journal of Personality and Social Psychology, 36, 1194-1201.

Staub, E., Tursky, B., & Schwartz, G.E. (1971). Self-control and predictability: Their effects on reactions to aversive stimulation. Journal of Personality and Social Psychology, 18, 157-162.

Switzky, H.N., & Haywood, H.C. (1974). Motivational orientation and the relative efficacy of self-monitored and externally imposed reinforcement systems in children. Journal of Personality and Social Psychology, 30, 360-366.

Vroom, V.H. (1970). The nature of the relationship between motivation and performance. In Vroom, V.H., & Deci, E.L. (Eds.), Management and Motivation (pp. 229-236). Baltimore, Md.: Penguin Books Inc.

Warehime, R.G., & Woodson, S. (1971). Locus of control and immediate affective states. Journal of Clinical Psychology, 27, 443-444.

Wessman, A.E. & Ricks, D.F. (1966). Mood and Personality. New York: Holt, Rinehart and Winston.

Wolk, S. (1976). Situational constraint as a moderator of the locus of control-adjustment relationship. Journal of Consulting and Clinical Psychology, 44, 420-427.