LEARNED HELPLESSNESS: EFFECT ON WORKING MEMORY AND FLUID INTELLIGENCE

THESIS

Presented to the Graduate Council of the North Texas State University in Partial Fulfillment of the Requirements

For the Degree of

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By

Peter Fernandez, B.S.
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To determine if learned helplessness treatment debilitates human working memory and fluid intelligence, 60 university students, classified as high or low self-monitors, were assigned to one of three treatments: intermittent (50%) controllable positive feedback, uncontrollable (yoked) negative feedback, and no treatment. Test tasks included backward digit and backward spatial span (representing working memory), matrices (representing fluid intelligence), vocabulary (representing crystallized intelligence), and forward digit and forward spatial span (representing immediate span of apprehension). Results generally were not significant and were discussed as possibly due to ineffective treatment procedure. Further research on this topic is needed.
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LEARNED HELPLESSNESS: EFFECT ON WORKING MEMORY AND FLUID INTELLIGENCE

Humans subjected to uncontrollable outcomes (outcomes independent of responding) have frequently demonstrated deficits in subsequent responding (see Miller & Norman, 1979, and Roth, 1980, for reviews of this literature). Uncontrollable outcomes like inescapable noise and random negative feedback have produced deficits in human instrumental learning (e.g. sliding a knob to terminate noise; Hiroto, 1974) and cognitive problem solving (e.g. solving anagrams; Benson & Kennelly, 1976). This phenomenon has been labeled learned helplessness (Seligman, 1975).

An explanation of learned helplessness has been offered by Seligman and his associates (Abramson, Seligman, & Teasdale, 1978; Maier & Seligman, 1976; Seligman, 1975). They claim that humans subjected to uncontrollable outcomes develop the expectation that future outcomes will be uncontrollable. This expectation transfers to subsequent situations and results in four behavioral deficits: difficulty learning response-outcome contingency (cognitive deficit); reduction of voluntary responding (motivational deficit); negative or depressed affect (emotional deficit); and lower self-esteem (self-esteem deficit).

An alternative explanation of learned helplessness has been offered by Kennelly, Crawford, Waid, and Rahaim (1980).
They claim that humans subjected to sustained uncontrollable negative feedback develop a functional impairment in the capacity for effortful problem solving (e.g. searching memory for solutions to a problem). This impairment of problem-solving effort transfers to subsequent situations and results in helplessness behavioral deficits, particularly the cognitive deficit.

Because problem-solving effort demands the allocation of attention and use of short-term memory capacity (Kennelly et al., 1980), studies employing the Kennelly et al. explanation have used measures of short-term memory to assess learned helplessness (Kennelly et al., 1980; Martin, 1980; Rahaim, 1980). These studies have shown that helplessness induction (exposure to uncontrollable outcomes) produces a debilitating effect on human short-term memory, particularly the short-term memory represented by backward memory span tasks (tasks requiring the immediate recall of items in reverse serial order).

Recently it has been suggested that the backward memory span tasks represent a working short-term memory (Horn, Donaldson, & Engstrom, 1981). This working memory (Baddeley, 1981) has been linked to fluid intelligence (Hayslip & Kennelly, 1982; Horn et al., 1981). Because of this link, it has been suggested that fluid abilities might be susceptible to helplessness induction (Kennelly et al., 1980). No study, however, has examined this possibility.
The purposes of the present study were to produce a helplessness effect on fluid intelligence and to replicate the helplessness effect on working memory (as measured by backward memory span tasks). Research related to these goals will be reviewed to further clarify the relationship among learned helplessness, working memory, and fluid intelligence.

The hypothesis that helplessness deficits reflect an impairment of problem-solving effort was tested by Kennelly et al. (1980) in a helplessness immunization experiment. This experiment was composed of three experimental phases: immunization against learned helplessness, helplessness induction, and test phase. It included six treatment groups, three of them the learned helplessness treatment triad (uncontrollable outcomes, controllable outcomes, and no-treatment control groups).

During the immunization phase, three groups of subjects received either 50%, 75%, or 100% controllable (response contingent) positive feedback while they worked on Levine (1971) type discrimination problems. Then these three groups plus an uncontrollable feedback group were subjected to sustained (75%) uncontrollable negative feedback during a word association task. A controllable feedback group also was given the word association task, but they received veridical feedback. Finally, these five groups plus a no-treatment control group were tested on three short-term memory measures: forward digit span (immediate recall of digits in serial order;
Wechsler, 1955), backward digit span (immediate recall of digits in reverse serial order; Wechsler, 1955), and word free-recall (immediate recall of words in any order). Kennelly et al. used short-term memory tasks because they measured the capacity for concentrated attentional effort (Hunt, 1978). Short-term memory deficits were expected only of the uncontrollable feedback and 100% immunization groups.

Results of the Kennelly et al. experiment indicated that the uncontrollable feedback and 100% immunization groups had significantly shorter backward digit strings and word lists than the controllable feedback and control groups combined. None of the other groups—including the 50% and 75% immunization groups—exhibited significant deficits on backward digit span or word free-recall. Kennelly et al. concluded that the short-term memory deficits reflected an impairment in the capacity for problem-solving effort. Furthermore, intermittent (50%, 75%) controllable positive feedback, unlike continuous (100%) controllable positive feedback, immunized subjects (the 50% and 75% groups) against helplessness induced short-term memory deficits. An interesting finding was that none of the treatment groups demonstrated a helplessness effect on forward digit span. Kennelly et al. attributed this to the minimal cognitive effort possibly demanded by forward digit span relative to backward digit span.
Short-term memory measures also were used by Rahaim (1980) to evaluate the effect of helplessness induction on different styles of attentional focus. Rahaim noted that individuals differ in the amount of attention focused on the environment: high self-monitors, in contrast to low self-monitors, expend more cognitive effort processing external cues to facilitate their successful management of environmental events (Elliott, 1979; Snyder, 1979). Because of these differences in attentional focus, Rahaim reasoned that high self-monitors would be more susceptible to uncontrollable feedback (helplessness induction).

Rahaim's experiment was composed of three experimental phases: pretest, treatment, and posttest. Prior to the pretest phase, all subjects completed the Snyder (1974) Self-monitoring Scale and were classified as high or low self-monitor. Then they were pretested on forward digit span to control for possible differences in short-term memory ability. (No significant differences were obtained.) During the treatment phase, high and low self-monitors were subjected to controllable feedback, uncontrollable feedback or no treatment. Feedback was administered during a word association task identical to that used by Kennelly et al. (1980). During the posttest phase, all subjects were tested on backward digit span, backward word span, and word free-recall.

Results of Rahaim's experiment indicated that only high self-monitors subjected to uncontrollable feedback
demonstrated significantly shorter backward digit strings and backward word strings than the comparison control group. According to Rahaim, "these subjects may have withdrawn psychologically from the threatening situation; and, consequently, failed to exert themselves on the test tasks" (p. 48). In addition, Rahaim's results indicated that only low self-monitors subjected to controllable feedback demonstrated significantly longer backward digit strings and word strings than the comparison control group. Rahaim attributed this learned competence effect (Benson & Kennelly, 1976) to the reinforcement of low self-monitors' problem-solving effort. None of the groups, however, demonstrated a helplessness or competence effect on word free-recall. This was attributed to the transient effect of laboratory treatment on human behavior.

Similar to the previous studies, Martin (1980) used short-term memory measures to assess learned helplessness. Martin was interested in determining whether the frequency of negative feedback or its uncontrollability produced helplessness deficits. Therefore, he varied both the controllability (controllable or uncontrollable) of feedback and the frequency (high or low) of negative feedback. In order to isolate the effects of controllability of feedback from the effects of negative feedback, Martin employed the learned helplessness yoking technique--pairing uncontrollable feedback subjects to controllable feedback subjects so that
the former receives the same feedback as the latter (Maier & Seligman, 1976).

Subjects initially were pretested on forward digit span to control for differences in short-term memory ability. (No significant differences were found.) Then they were exposed to one of five treatments: controllable low negative feedback (negative feedback given only upon incorrect responding), uncontrollable low negative feedback (given same feedback as controllable low negative feedback partner), controllable high negative feedback (50% of correct responses and all incorrect responses were followed by negative feedback), uncontrollable high negative feedback (given same feedback as controllable high negative feedback partner), or no treatment. Feedback was administered during Levine (1971) type discrimination problems. Finally, all subjects were tested on backward digit span and backward letter span.

None of the treatment groups in Martin's (1980) study demonstrated significant impairment on backward digit span or backward letter span. However, the means of the uncontrollable high negative feedback group, relative to the no treatment group, revealed a definite pattern of impairment, particularly on backward letter span. No such pattern was evident for the means of the controllable high negative feedback group. Therefore, Martin concluded that helplessness deficits were probably produced by high amounts of negative uncontrollable feedback.
In summary, humans subjected to helplessness induction subsequently have demonstrated deficits in short-term memory. These deficits have been attributed to a functional impairment in the capacity for problem-solving effort. Moreover, they have been noted primarily on backward memory span tasks, particularly backward digit span.

By combining the experimental techniques of the previous experiments, the present study attempted to replicate the helplessness effect on backward digit span. Subjects were classified as high or low self-monitor and subjected to one of three treatments: intermittent (50%) controllable positive feedback, uncontrollable feedback, or no treatment. Subjects in the uncontrollable feedback condition were yoked to subjects in the controllable feedback condition. Test tasks included forward and backward digit span. It was predicted that only high self-monitors subjected to uncontrollable feedback would exhibit a helplessness effect on backward digit span. In contrast, only low self-monitors subjected to controllable feedback would exhibit a competence effect on backward digit span. Such findings would replicate Rahaim's (1980) results. None of the treatment groups were expected to demonstrate a helplessness or competence effect on forward digit span. Such findings would replicate the Kennelly et al. (1980) results.

In accounting for the differential effect of helplessness induction on forward and backward digit span, Kennelly et al. (1980) suggested that backward digit span required more
cognitive effort than forward digit span. Similarly, Horn, Donaldson, and Engstrom (1981) have suggested that forward digit span represents a "passive span of apprehension" (Hayslip & Kennelly, 1982, p. 315), whereas backward digit span represents a "working short-term memory" (see Baddeley, 1981, for a review of the working memory literature). Passive span of apprehension was defined as the capacity to retain information in immediate awareness (e.g. recall of digits in serial order limited to 7 digits, plus or minus 2; Miller, 1956). In contrast, working memory referred to the capacity to manipulate (reorganize) information in immediate awareness (e.g. recall of digits in reverse order; Horn et al., 1981). By adopting this distinction, the helplessness effect on backward digit span could be interpreted as a debilitation of working memory.

Employing the passive-working memory distinction, Horn et al. (1981) sought to determine the relationship between short-term memory and fluid intelligence. They found that working memory (measured by backward digit span), passive apprehension (measured by forward digit span), and fluid intelligence (measured by matrices, letter series, and paper-folding tasks) declined with age throughout adulthood. However, only working memory was significantly correlated with fluid intelligence. Horn et al. concluded that the aging decline of fluid intelligence was associated primarily with the aging decline of working memory. This conclusion later was supported by Hayslip and Kennelly (1982).
Fluid intelligence and its counterpart, crystallized intelligence, constitute the two major components of general intelligence (see Matarazzo, 1972, pp. 54-58 for a brief summary of the fluid-crystallized intelligence theory). Both components have been "characterized by processes of perceiving relationships, educing correlates, maintaining span of immediate awareness in reasoning, abstracting concept formation, and problem solving" (Horn, 1978, p. 220). They differ in that tests (e.g. vocabulary) of crystallized intelligence reflect education and/or acculturation, whereas tests (e.g. matrices) of fluid intelligence reflect innate potential and/or neurophysiological status. Moreover, crystallized intelligence increases with age, whereas fluid intelligence declines with age.

Because of the link between working memory and fluid intelligence, helplessness induction might have a debilitating effect on fluid abilities (Kennelly et al., 1980). The present study examined this possibility by including measures of fluid and crystallized intelligence in the test phase.

Method

Subjects

Subjects included 36 females and 24 males from the psychology department subject pool of North Texas State University. This subject pool consists of undergraduates in psychology classes who volunteer for experiments in exchange for extra course credit. Subjects were pretested on Snyder's
(1974) Self-monitoring Scale and were classified as high (score above 12) or low (score below 12) self-monitor. The cut-off points used to classify subjects were identical to those used by Rahaim (1980). Classification of subjects was done by a research assistant, so the experimenter was blind to subjects' level of self-monitoring. Subjects were randomly assigned to treatments that were administered according to a pre-randomized running block schedule of conditions. An exception to randomness was that uncontrollable feedback subjects were treated only after their controllable feedback partner.

**Design**

The experiment was composed of a treatment phase and a test phase. During the treatment phase, a 2 x 3 between-subjects design was used, involving two levels of self-monitoring (high and low), and three levels of treatment (controllable feedback uncontrollable feedback, and no treatment). Similar to Martin's (1980) experiment, subjects in the controllable feedback condition were subjected to an intermittent (50%) schedule of controllable positive feedback during Levine (1971) type discrimination problems. Also, subjects in the uncontrollable feedback condition were yoked to subjects in the controllable feedback condition. None of the subjects in the no-treatment condition were exposed to the treatment task; they were given the test tasks after being introduced to the experiment.

Upon completing the treatment task, the controllable feedback and uncontrollable feedback subjects were given
an attribution questionnaire to assess their causal ascription for task performance. After completing the questionnaire, they were given the test tasks in the following order: forward digit span, backward digit span, vocabulary, matrices, forward spatial span, and backward spatial span.

**Apparatus and Materials**

**Self-monitoring scale.** Snyder's (1974) Self-monitoring Scale consists of 25 items to which subjects respond true or false. It is scored in the direction of high self-monitoring.

**Treatment task.** The treatment task resembled the immunization task used by Kennelly et al. (1980). Four Levine (1971) type discrimination problems were contained in a three-ring binder. Each problem consisted of 20 stimulus pages with four geometric designs to a page. Designs varied according to the values of three stimulus dimensions: shape--circle, square, or triangle; size--large or small; and shading--shaded or unshaded. Only one design on each page reflected the two values designated by the experimenter as the correct solution to the problem. The two correct values for each of the four problems were (a) large-shaded figure, (b) unshaded triangle, (c) shaded square, and (d) small circle. After subjects selected a design, they were told that their choice was either "correct" or "wrong."

**Attribution questionnaire.** The attribution questionnaire was similar to the one used by Kuiper (1978). Subjects rated
their performance on the discrimination problems according to the following four factors: ability, luck, task difficulty, and effort. Ratings were indicated on a 7-point scale with 1 labeled not important at all and 7 labeled extremely important.

Test tasks. The forward and backward digit span subtests of the Wechsler Adult Intelligence Scale (Wechsler, 1955) were used as measures of passive apprehension and working memory, respectively. Two subtests from the Horn (1975) Fluid Intelligence-Crystallized Intelligence (Gf-Gc) Sampler were used to measure the intelligence variables: vocabulary measured crystallized intelligence, and matrices measured fluid intelligence. All tasks were administered according to their instruction manual.

In addition, a checker-tapping task, similar to Corsi's block-tapping task (Milner, 1971), was used to measure forward and backward spatial span. This task consisted of nine checkers positioned irregularly on top of a cardboard sheet. During forward spatial span, the experimenter tapped the checkers in a forward sequence, and the subject repeated the sequence. During backward spatial span (K. J. Kennelly, personal communication, January, 1981) the experimenter again tapped the checkers in a forward sequence, but the subject repeated the sequence in reverse order. Like the digit span task, the number of checkers tapped increased after each correct trial. Spatial memory span was determined by the longest sequence of checkers tapped in correct order.
Spatial memory span tasks were included in the present experiment because Baddeley and Lieberman (1980) had concluded that working memory was composed of a visual-spatial component, as well as a verbal-auditory component.

Room arrangement and equipment. Subjects sat across a table and faced the experimenter. A small wooden partition between the experimenter and the subject concealed the feedback schedules and the test tasks. A stopwatch was used to time subjects' response latency.

Procedure

The Snyder (1974) Self-monitoring Scale was administered to groups of subjects. After completing the scale each subject was scheduled for an individual experimental session. Upon entering the experimental room, the subject was seated and introduced to the experiment.

This experiment consists of several tasks that are related to intelligence. You will be read the instructions to each task and instructed to perform the task to the best of your ability. You are free to ask questions after the instructions have been read to you. Are you ready to begin?

This introduction was meant to provide subjects with a rationale of the experiment and was intended to enlist their cooperation. After the introduction, subjects in the control group were given the test tasks. Subjects in the controllable and uncontrollable feedback groups proceeded to the treatment task.
During the treatment phase, the binder containing the
discrimination problems was placed before the subject. It
was opened to the first page of a three page example. Next
to the binder was placed a dimensions plate (sheet of paper)
that exhibited the three stimulus dimensions and their values.
Then the subject was read the following instructions:

This is the first task. Each page in this binder has
four figures (experimenter points to the figures).
These figures vary according to shape, size, and
shading. (Experimenter places dimensions plate on top
of example.) These three dimensions—shape, size, and
shading—have different values. The values for the
shape dimension are a square, a triangle, and a circle
(experimenter points to the values). The size dimension
values are small and large (experimenter points). And
the shading dimension values are shaded and unshaded
(experimenter points). (Experimenter removes the dimen-
sions plate.)

Every figure on this page has values from the three
dimensions. For example, this figure is a large, unshaded
square (experimenter points). Now you tell me the values
for the remaining figures.

Having subjects recite the values of the designs was meant
to insure that they understood the concepts of dimensions and
their values. Subjects who failed to respond correctly were
read the instructions until they responded correctly. Then the
experimenter continued with the following instructions:

Listen carefully. (Experimenter places dimensions plate on top of example.) One figure on each page reflects two critical values that have been designated the correct solution to this problem. (Experimenter removes dimensions plate.) For example, on this page the two correct values are small and shaded. Point to the figure that is small and shaded. (If subject points to correct figure, experimenter says "correct"; if subject points to incorrect figure, experimenter says "wrong." Then experimenter flips the page.) On this page which figure has the two correct values, small and shaded? (Experimenter gives feedback and flips page.) And on this page which figure has the correct values, small and shaded? (Experimenter gives feedback and flips page. A blank page precedes the first problem.)

This next problem is similar to the example problem except that it has 20 pages instead of 3, and it has a different solution. You will not be told which two values solve the problem. You will solve the problem by the feedback that you receive after each page. Each page will be shown for 15 seconds. Within the 15 seconds, point to the figure you think has the two correct values. Then you will be given feedback. If the figure you chose was incorrect, you will always be told "wrong." If the figure you chose was correct, you may
be told, "correct," or you may be told, "wrong." However, on the average, choosing a correct figure will result in you being told "correct" more often than you are told "wrong." Upon completing the problem, you will be asked to name the two values that solve the problem. Then you will be told "correct" or "wrong." Do you have any questions?

After the procedure was clarified, subjects were reminded to select a stimulus figure within the allotted 15 seconds. They also were told that the experimenter would flip the pages of the binder. Pages were flipped immediately after feedback was given.

For the controllable feedback groups, the experimenter said "correct" 50% of the time the subject pointed to the correct figure. The other 50% of the time, and each time the subject pointed to an incorrect figure, the experimenter said "wrong." For the uncontrollable feedback groups, the experimenter gave the subject the same feedback that had been given to its yoked controllable feedback partner.

Upon completion of the first problem, the binder pages were turned to the blank page that preceded the first problem; the same 20 pages were used for the second problem. An additional 20-page set was used for the third and fourth problems. These three problems were introduced in the following manner: "Let us continue to the next problem. Remember, the two values that solve this problem are different from those in the preceding problem. Ready? Begin."
After completing the discrimination problems, the controllable feedback and uncontrollable feedback groups were given the attribution questionnaire. This questionnaire was introduced as "questions regarding the task just completed." After completing the questionnaire, the controllable feedback and uncontrollable feedback groups were given the test tasks. All groups completed the test tasks in the following order: forward digit span, backward digit span, vocabulary, matrices, forward spatial span, and backward spatial span. The span tasks were introduced as "tests of memory," whereas the intelligence tests were introduced as "other tasks."

When subjects completed the test tasks, they were debriefed and thanked for their participation. Subjects in the uncontrollable feedback conditions were informed of the deception on the discrimination problems. They were also encouraged to repeat the task under veridical feedback.

Results

The means and standard deviations for the self-monitoring scores of high and low self-monitors are presented in Table 1. To test the equality of treatment groups within each level of self-monitoring, separate one-way analyses of variance were performed on the scores of high and low self-monitors. Results indicated that there were no significant differences among the scores of high self-monitors, $F(2, 27) < 1$, or low self-monitors, $F(2, 27) = 3.03, p > .05$. Thus, within each level
of self-monitoring, the random assignment of subjects produced comparable treatment groups.

<table>
<thead>
<tr>
<th>Treatment Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controllable Feedback</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>High Self-monitors</td>
</tr>
<tr>
<td>M</td>
</tr>
<tr>
<td>SD</td>
</tr>
<tr>
<td>Low Self-monitors</td>
</tr>
<tr>
<td>M</td>
</tr>
<tr>
<td>SD</td>
</tr>
</tbody>
</table>

**Treatment Task**

The means and standard deviations for the number of correct responses on each of the four discrimination problems are presented in Table 2. Separate 2 (self-monitoring) x 2 (treatment) analyses of variance were computed on the correct responses of each problem. Results of problem 1 yielded a nonsignificant main effect for self-monitoring, $F < 1$, a significant main effect for treatment, $F (1, 36) = 11.64$, $p < .01$, but a nonsignificant treatment x self-monitoring interaction, $F < 1$. Inspection of the means (see Table 2) indicates that subjects in the controllable feedback condition performed better than subjects in the uncontrollable feedback condition.
Table 2
Means and Standard Deviations for the Number of Correct Responses on the Discrimination Problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Treatment Condition</th>
<th>Controllable Feedback</th>
<th>Uncontrollable Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High Self-monitors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>12.30</td>
<td>3.69</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>8.00</td>
<td>4.43</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>8.00</td>
<td>4.20</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>10.30</td>
<td>3.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low Self-monitors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>13.60</td>
<td>4.82</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>10.20</td>
<td>5.25</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>9.20</td>
<td>6.90</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>7.80</td>
<td>4.85</td>
</tr>
</tbody>
</table>

Note. Maximum number of correct responses = 20.

Likewise, the results of problems 2, 3, and 4 indicated a significant treatment effect, $F_s (1, 36) = 12.15, p < .01$; $7.08, p < .05$; and $19.93, p < .01$, respectively, but no significant self-monitoring or interaction effects, all $F_s (1, 36) = 2.69$ or less, $p > .05$. Inspection of the means of each problem
(see Table 2) indicates better performance for subjects in the controllable feedback condition. However, unlike problem 1, the controllable feedback subjects performed at the level of "chance" (i.e. 10 of 20 responses being correct), or below, on problems 2, 3, and 4.

Additional inspection of the means of correct responses (see Table 2) indicates a performance decline in all groups with each succeeding problem. For example, low self-monitors subjected to controllable feedback averaged 13.6 correct responses on problem 1, 10.2 on problem 2, 9.2 on problem 3, and 7.8 on problem 4. Such a decline--especially of subjects treated with controllable feedback--suggests difficulty in learning to solve discrimination problems.

Finally, the percentage of negative feedback received by high and low self-monitors in the controllable feedback condition was 77.3% and 76.2%, respectively. Because of the yoking technique, high and low self-monitors in the uncontrollable feedback condition received the same amount of negative feedback as their controllable feedback partner. Therefore, the intermittent (50%) positive feedback schedule employed in the controllable feedback condition produced a substantial (at least 76.2%) amount of uncontrollable negative feedback in the uncontrollable feedback condition.

**Attribution Measure**

The means and standard deviations for the ratings of the four attribution items--effort, ability, luck, and task
difficulty—are presented in Table 3. Separate 2 (self-monitoring) x 2 (treatment) analysis of variance were performed on the ratings of each problem.

Table 3
Means and Standard Deviations for the Ratings of the Attribution Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Treatment Condition</th>
<th>Controllable Feedback</th>
<th>Uncontrollable Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Self-monitors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort</td>
<td>M 5.60</td>
<td>4.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 1.43</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>Ability</td>
<td>M 4.30</td>
<td>4.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 1.61</td>
<td>1.17</td>
<td></td>
</tr>
<tr>
<td>Luck</td>
<td>M 4.00</td>
<td>3.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 1.84</td>
<td>1.91</td>
<td></td>
</tr>
<tr>
<td>Task Difficulty</td>
<td>M 4.10</td>
<td>5.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 1.81</td>
<td>1.51</td>
<td></td>
</tr>
<tr>
<td>Low Self-monitors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort</td>
<td>M 4.80</td>
<td>4.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 1.54</td>
<td>1.36</td>
<td></td>
</tr>
<tr>
<td>Ability</td>
<td>M 4.00</td>
<td>3.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 2.00</td>
<td>1.86</td>
<td></td>
</tr>
<tr>
<td>Luck</td>
<td>M 3.00</td>
<td>3.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 1.55</td>
<td>1.78</td>
<td></td>
</tr>
<tr>
<td>Task Difficulty</td>
<td>M 4.00</td>
<td>4.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 1.48</td>
<td>1.30</td>
<td></td>
</tr>
</tbody>
</table>

Note. Maximum rating = 7. High ratings indicate that the factor was an "extremely important" determinant of performance.
For the effort, ability, and luck items, the results did not indicate significant main effects or interaction effects, all $F$s (1, 36) = 1.87 or less, $p > .05$. For the task difficulty item, there also were no significant self-monitoring or interaction effects, both $F$s < 1. However, there was a trend toward a treatment effect, $F(1, 36) = 3.43$, $p < .10$, with subjects in the uncontrollable feedback condition attributing greater importance to task difficulty as a determinant of performance.

**Test Tasks**

The means and standard deviations for the scores on the intelligence and short-term memory measures are presented in Table 4. Separate 2 (self-monitoring) x 3 (treatment) analyses of variance were computed on the scores of each measure. No significant main effects or interaction effects were obtained for forward digit span, all $F$s < 1; backward digit span, all $F$s < 1; vocabulary, all $F$s (2, 54) = 3.13 or less, $p > .05$; matrices, all $F$s (2, 54) = 3.05 or less, $p > .05$; forward spatial span, all $F$s < 1; or backward spatial span, all $F$s < 1.

In addition, because prior research and/or theory dictated the hypotheses of the present study, the following planned comparisons were performed among the high self-monitor and among the low self-monitor groups: uncontrollable feedback versus no-treatment; controllable feedback versus no-treatment; and uncontrollable feedback versus controllable feedback.

Mean comparisons for the backward memory span measures and the
Table 4
Means and Standard Deviations for the Intelligence and Short-term Memory Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Controllable Feedback</th>
<th>Uncontrollable Feedback</th>
<th>No Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td><strong>High Self-monitors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward Digit Span</td>
<td>7.10</td>
<td>7.40</td>
<td>7.00</td>
</tr>
<tr>
<td></td>
<td>.70</td>
<td>1.11</td>
<td>2.25</td>
</tr>
<tr>
<td>Backward Digit Span</td>
<td>5.80</td>
<td>5.40</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>1.40</td>
<td>1.50</td>
<td>1.34</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>11.00</td>
<td>10.30</td>
<td>11.80</td>
</tr>
<tr>
<td></td>
<td>1.41</td>
<td>2.49</td>
<td>1.54</td>
</tr>
<tr>
<td>Matrices</td>
<td>9.00</td>
<td>8.70</td>
<td>10.10</td>
</tr>
<tr>
<td></td>
<td>2.05</td>
<td>3.19</td>
<td>3.59</td>
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<tr>
<td>Forward Spatial Span</td>
<td>5.90</td>
<td>5.80</td>
<td>6.20</td>
</tr>
<tr>
<td></td>
<td>.94</td>
<td>1.08</td>
<td>.75</td>
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<tr>
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<td>5.50</td>
<td>5.20</td>
<td>5.00</td>
</tr>
<tr>
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<td>1.02</td>
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<td>5.40</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>.94</td>
<td>.80</td>
<td>1.84</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>10.20</td>
<td>11.60</td>
<td>10.20</td>
</tr>
<tr>
<td></td>
<td>2.09</td>
<td>1.43</td>
<td>1.54</td>
</tr>
<tr>
<td>Matrices</td>
<td>7.60</td>
<td>8.80</td>
<td>6.80</td>
</tr>
<tr>
<td></td>
<td>3.07</td>
<td>3.31</td>
<td>3.84</td>
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<tr>
<td>Forward Spatial Span</td>
<td>6.00</td>
<td>6.00</td>
<td>5.90</td>
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<tr>
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<td>1.00</td>
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<td>4.90</td>
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<tr>
<td></td>
<td>.94</td>
<td>1.13</td>
<td>.94</td>
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</table>
fluid intelligence measure were evaluated by one-tailed tests. All other comparisons were evaluated by two-tailed tests.

On forward digit span, the comparisons among high self-monitors indicated that the uncontrollable feedback group did not differ significantly from the no-treatment or controllable feedback groups, both $F_s < 1$. There also was no significant difference between the controllable feedback and no-treatment groups, $F < 1$. Among low self-monitors, the controllable feedback group did not differ significantly from the no-treatment group or the uncontrollable feedback group, both $F_s (1, 54) = 1.29, p > .05$. There also was no significant difference between the uncontrollable feedback and no-treatment groups, $F < 1$.

Results of forward spatial span paralleled those of forward digit span. There were no significant contrasts among the means of high self-monitors or low self-monitors, all $F_s < 1$. Therefore, the forward memory span measures—representing passive apprehension—did not reveal significant helplessness or competence effects.

For backward digit span, the mean comparisons among high self-monitors and among low self-monitors did not yield significant results, all $F_s < 1$. Similarly, no significant results were obtained for backward spatial span, all $F_s (1, 54) = 1.12$ or less, $p > .05$. Therefore, the backward memory span measures—representing working memory—did not reveal significant helplessness or competence effects.
On the vocabulary test, the mean comparisons among high self-monitors indicated that the uncontrollable feedback group performed marginally poorer than the no-treatment group, $F(1, 54) = 3.14, p < .10$, two-tailed test. However, there was no significant difference between the uncontrollable feedback and controllable feedback groups, $F < 1$. Also, the comparison between the controllable feedback and no-treatment groups was not significant, $F < 1$. Among low self-monitors, none of the comparisons were significant, all $F$s $(1, 54) = 2.73$ or less, $p > .05$.

For the matrices test, all pairwise comparisons among high self-monitors and among low self-monitors were not significant, all $F$s $(1, 54) = 1.73$ or less, $p > .05$. Therefore, the matrices and vocabulary tests—representing crystallized and fluid abilities, respectively—did not yield significant helplessness or competence effects.

Discussion

The results of the present study clearly do not support the assumption that learned helplessness treatment produces an impairment of working memory and fluid intelligence. Neither high nor low self-monitors subjected to sustained uncontrollable negative feedback exhibited significant deficits in backward memory span (representing working memory) or matrices (representing fluid intelligence) tasks. In fact, no significant deficits (learned helplessness) or facilitations (learned competence) were manifested by any of the treatment groups on any of the test tasks.
Failure to obtain significant results can possibly be attributed to the ineffectiveness of the experimental treatments. Subjects in the controllable feedback condition performed poorly on most of the discrimination problems (see Table 2). Poor performance indicates that subjects were not learning how to solve the discrimination problems. This may have been due to subjects limited expenditure of cognitive effort and/or the number of trials per problem: the present study used 20 trials per problem, whereas Martin (1980) and Kennelly et al. (1980) used 25 trials per problem. In the case of low self-monitors, their poor performance limited the reinforcement of their problem-solving effort, possibly attenuating the development of learned competence.

Subjects in the uncontrollable feedback condition received a substantial (at least 76.2%) amount of uncontrollable negative feedback during the discrimination problems. They also averaged significantly fewer correct responses per problem than their controllable feedback partners (see Table 2).

However, lack of helplessness effects on the test tasks might have been a function of subjects' causal attributions for performance on the discrimination problems (Abramson et al., 1980). Uncontrollable feedback subjects, in contrast to controllable feedback subjects, tended to ascribe their poor performance to "task difficulty" (see Attribution Measure results). Since task difficulty signifies an external factor—as opposed to "ability," which signifies an internal
factor (Weiner, 1974)—high self-monitors in the uncontrollable feedback condition could have reasoned that their poor performance was limited to the discrimination problems. Consequently, they might not have applied the expectation of uncontrollable outcomes to the test tasks (Tennen & Eller, 1977). Subjects might also have suspended problem-solving effort after working on some of the discrimination problems; subsequent impairment of problem-solving effort would not have occurred.

Overall the discrimination problems employed in the present study have proven effective as immunization against helplessness induction (Kennelly et al., 1980), but their utility as helplessness/competence treatments has yet to be demonstrated. Martin (1980) did not obtain significant treatment effects with a closely similar treatment procedure.

Ineffectiveness of treatments could also have been a function of the yoking technique. This technique has proven successful in experiments (e.g. Hiroto & Seligman, 1975) that induced helplessness with instrumental treatments (e.g. inescapable noise). It however, has not been often used in experiments employing cognitive treatments (e.g. discrimination problems) to induce helplessness (for an exception, see Kennelly, Weinberg, Waid, Horne, & Fernandez, 1982). The success of the yoking technique with instrumental treatments has been attributed to the subjective distress evoked by unconditioned stimuli (Costello, 1978; however, see Seligman,
1978, for a rebuttal of this assertion). Perhaps the negative feedback of the present study failed to evoke sufficient distress, like that produced by noise and other aversive stimuli. Further research is needed to isolate the effective components of the yoking technique, especially with cognitive treatments.

It is possible that helplessness could have been induced and that the test tasks were insensitive to helplessness deficits. Such an explanation seems plausible for measures of immediate apprehension (forward digit and spatial span), crystallized intelligence (vocabulary), and fluid intelligence (matrices). However, backward digit span performance—representing working memory—has proven sensitive to helplessness treatment effects (Kennelly et al., 1980; Rahaim, 1980), even when preceded by another test task (Kennelly et al., 1980). Therefore, failure to obtain deficits in working memory could not have been a function of insensitive tests or transient effects of treatment.

In summary, the present research attempted to demonstrate helplessness/competence effects on measures of working memory and fluid intelligence. The nonsignificant results were attributed primarily to ineffective treatments. Perhaps further research with improved procedures might clarify the relationships among learned helplessness, working memory, and fluid intelligence.
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