Expectation of Success Following Noncontingent Punishment in Introverts and Extraverts

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Recent findings indicate that extraverts are more likely than introverts to continue responding in the face of punishment and frustrating nonreward (Newman & Kosson, 1984; Tiggesmann, Winefield, & Brehmer, 1982). The current study investigates whether extraverts' expectations for success are, similarly, resistant to interruption and alteration. To test this hypothesis, 50 introverted and 50 extraverted male undergraduates were exposed to pretreatment with either a 50% level of noncontingent reward or a 50% level of noncontingent punishment. As predicted, there were significant Group X Pretreatment interactions on all dependent measures. In comparison to those introverts who received the punishment pretreatment, extraverts exposed to the same pretreatment placed larger wagers on their ability to succeed, and reported higher levels of perceived control. In addition, relative to their estimates for the pretreatment task, extraverts exposed to noncontingent punishment increased their expectation for success, whereas introverts exposed to noncontingent punishment decreased their performance expectations. No differences were observed between the two groups following pretreatment with noncontingent reward. The results suggest that extraverts are characterized by a distinctive reactive to punishment involving response facilitation as opposed to response inhibition.

Individual differences in response to punishment play an important role in models of personality and psychopathology. Response to punishment may vary from a seeming "insensitivity" to punishment evidenced in the psychopath's failure to profit from punishment (Cleckley, 1982; Hare, 1970) to an apparent preoccupation with aversive outcomes seen in the negative cognitive set of depressed individuals (Beck, 1976). A similar range of response to punishment is thought to underlie the personality dimension of introversion/extraversion. Gray (1972), for instance, has presented a neuropsychological theory of introversion/extraversion which ties this dimension of personality to septo-hippocampal functioning at the neurological level and to sensitivity to punishment at the psychological level.

A somewhat different perspective on the potential significance of septo-hippocampal functioning for extraversion has been proposed by Gorenstein and Newman (1980). These authors argue that the psychological processes evidenced in the behavior of rats with septal lesions provide a useful model for research into a family of human syndromes characterized by impulsive, disinhibited behavior such as extraversion and psychopathy. Although no definitive summary of septal dysfunction is offered, the authors propose that the extensive literature on rats with septal lesions provides a rich context for generating hypotheses about the psychological processes underlying syndromes of disinhibition. Unlike Gray (1972, 1982), Gorenstein and Newman (1980) have emphasized McCleary's (1966) characterization of the response modulation deficits associated with septal lesions and, in particular, have focused on "perseveration" as a deficit of particular importance for syndromes of disinhibition. McCleary described perseveration in rats with septal lesions as the tendency to emit a dominant response despite punishment, extinction, or contingency reversal. In contrast to Gray's (1972) focus on sensitivity to punishment (cf. Gray, 1982), this description of septal functioning emphasizes the importance of an established (i.e., dominant) response set in bringing about the behavioral deficits associated with septal dysfunction (see also, Newman, Gorenstein, & Kelsey, 1983).

In order to investigate perseveration in introverts and extraverts, Newman and Kosson (1984) used three tasks in which optimal performance required subjects to adopt a response set and then to alter that response set as the task progressed. In all three tasks, the performance of extraverts was characterized by a tendency to perseverate the original response set and to make more errors than introverts. In contrast, the performance of introverts and extraverts did not differ on two other learning tasks in which alteration of a response set was not required. These experiments provide evidence that extraverts are slower than introverts to alter an established response set, but it may be argued that extraverts persist in responding because they are less sensitive than introverts to the punishment and frustrating nonreward which indicate that response contingencies have changed. However, Newman, Widom, and Nathan (1985) have reported a deficit in response inhibition among extraverts that is more difficult to attribute to extraverts' insensitivity to punishment. Although the performance of introverts and extraverts was comparable on a discrimination task involving punishment only, extraverts committed an excess of punished responses on the same task when avoidance required subjects to inhibit a rewarded response. Thus, it appears that in the absence of reward, extraverts were suffi-
ciently motivated by the performance to perform as well as introverts, whereas the same punishment was insufficient to alter the extraverts’ tendency to respond for reward.

Such findings suggest that, in comparison to introverts, extraverts are less likely to alter their goal-oriented responding in the face of punishment. A similar conclusion was reached by Tiggemann, Winefield, and Brebner (1982) who used pretreatment with escapable and inescapable noise to investigate learned helplessness in introverts and extraverts. As predicted, pretreatment with inescapable noise resulted in reduced responding among introverts but did not reduce responding among extraverts on a subsequent escape-avoidance task. The results of Tiggemann et al. (1982) provide further evidence that the goal-oriented behavior of extraverts is relatively unsusceptible to the inhibiting effects of punishment. In addition, the results suggest a potential association between the response perseveration exhibited by extraverts and the optimistic cognitive style that is considered fundamental to their disposition (e.g., Eysenck & Rachman, 1971; Wilson, 1981).

According to proponents of the learned helplessness model of depression, helplessness occurs when a person develops the expectation that responding will not alter the probability of a desired outcome (Abramson, Seligman, & Teasdale, 1978). Thus, the demonstration by Tiggemann et al. (1982) that extraverts are resistant to the development of learned helplessness suggests that their expectations for success (efficacy expectations), like their approach responding, may be resistant to interruption or alteration. Although it is tempting to associate extraverts’ behavioral and cognitive styles, Tiggemann et al. (1982) argued against a cognitive interpretation of their results because the performance difference between introverts and extraverts was not paralleled by group differences in perceived control or causal attribution. However, as noted by the authors, these ratings may not have represented accurately the extent to which subjects believed that responding could alter the probability of escape during the experiment proper because the assessments were made after the tasks were completed.

The purpose of the experiment presented here is to investigate further the effect of noncontingent punishment on the performance of introverts and extraverts, with an emphasis on subjects’ expectations of obtaining reward on a subsequent task. In so doing, our purpose is not to challenge the results of Tiggemann et al. (1982) who used a different procedure nor to investigate learned helplessness in introverts and extraverts, because our noncontingent pretreatment is atypical of helplessness inducing procedures. Rather, we have used a noncontingent pretreatment similar to one used by Alloy and Abramson (1979) in order to extend our previous findings regarding the failure of punishment to alter the goal-oriented behavior of extraverts. The noncontingent nature of the task serves to insure equal success and failure among all subjects. To this end, introverts and extraverts are exposed to a pretreatment involving a 50% level of noncontingent punishment presented as a problem-solving task. Following this pretreatment, subjects receive 10 more trials of the same task including, however, the opportunity to win as well as to lose money. In addition, a pretreatment condition with noncontingent reward is included to control for differences in performance that may be unrelated to punishment. Four dependent measures are used to assess the effect of the pretreatment manipulations on subjects’ subsequent expectations. One measure is the difference between subjects’ estimates of anticipated success, elicited prior to pretreatment and immediately after pretreatment. Two other measures are designed to assess subjects’ confidence by the size of the bets they place, and the final measure, included for the purpose of comparison with other studies, involves subjects’ judgments of perceived control.

In summary, this experiment involves a $2 \times 2$ (Group $\times$ Pretreatments) design with four dependent measures. On the basis of the foregoing discussion, it is expected that extraverts’ expectations of obtaining reward, like their goal-oriented behavior, will be resistant to alteration by punishment, whereas introverts’ expectations of obtaining reward are expected to decrease following pretreatment with noncontingent punishment. Therefore, a Groups $\times$ Pretreatment interaction is predicted on all four measures with extraverts exhibiting greater confidence than introverts following pretreatment with noncontingent punishment but not following pretreatment with noncontingent reward.

Method

Subjects
One hundred male undergraduates at the University of Wisconsin volunteered to participate in the study in exchange for experimental credit points. Testing was conducted over a two-semester period. Subjects were randomly assigned to condition and later classified as extraverts or introverts on the basis of scores on the extraversion scale of the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975). Subjects scoring 15 and under were classified as introverts ($M = 11.19$), those scoring 16 and higher were classified as extraverts ($M = 18.39$). This cutting score was selected because it has been found to yield approximately equal proportions of introverts and extraverts among the undergraduate males of the University of Wisconsin. For each semester, we continued testing subjects until each of the experimental cells was filled. Three subjects were unable to complete the experiment due to equipment failure. Personality measures and behavioral tasks were administered individually by one of two female experimenters who remained blind to subjects’ extraversion scores.

Experimental Design
The experiment was a $2 \times 2$ (Pretreatment Conditions $\times$ Levels of Extraversion-Introversion) factorial design. The two pretreatment conditions differed in the valence of feedback but did not differ in the frequency of reinforcement, the degree of control subjects’ responses exerted over the outcome, or the actual monetary value of the outcome. On 50% of the 20 trials, subjects were led to believe that they had been successful in producing a graphic display (i.e., a starburst) although responding and the occurrence of the starburst were actually independent. Subjects in the pretreatment involving noncontingent reward saw their earnings increase from no money to $2.50, receiving 25¢ each time the graphic was displayed. The earnings of subjects receiving pretreatment with noncontingent punishment decreased from $5.00 to $2.50, with these subjects losing 25¢ each time the graphic did not appear. Fifty subjects were assigned to each condition.

Apparatus and Materials
The experiment was conducted in a two-room suite. Subjects were seated in the experimental room in front of an Apple III monitor and a

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1 Analysis of variance yielded no significant differences for the effect of semester on any of the dependent measures, and subjects tested in each semester ($N = 60, N = 40$) were combined.
two-button response panel. The response panel was a rectangular, black, plastic box, 16 x 9.5 x 5 cm with two game control push buttons, topped with 12-mm green caps, located on the top side of the box. The two microbuttons were 4 cm apart and equidistant from the side, front, and back of the top panel. The buttons were labeled 1 and 2. An Apple II Plus was housed in the control room. A computer program developed by the authors controlled the entire task presentation and recorded subjects' responses, including button choices and bets.

**Questionnaires.** In addition to the Eysenck Personality Questionnaire (EPQ), subjects completed the Multicomponent Anxiety Inventory IV (Schalling, 1978) and the Socialization Scale of the California Personality Inventory (Gough, 1960), prior to beginning the tasks. Other materials included a judgment of control scale, marked off in units of 10 with extreme values labeled 0 and 100, and a questionnaire concerning the behavioral tasks. This questionnaire was divided into two main sections, with one section pertaining to the pretreatment task and others pertaining to the betting task. Each section contained rating scales for emotional reactions and questions concerning causal attributions for performance.

**Pretreatment.** The pretreatment condition used in this experiment was modeled on the pretreatments used in the learned helplessness literature, specifically on tasks reported by Alloy and Abramson (1979), and involved 50% noncontingent success and failure (win-lose) feedback. Subjects were presented with a cue to signal the beginning of each trial. The cue consisted of the phrases “Button 1” and “Button 2,” enclosed in 4.5 x 2.5 cm rectangles that were 6 cm apart on the computer monitor. On correct trials, subjects’ button presses were followed by the presentation of a computer graphic (starburst pattern) on the monitor. On incorrect trials, the computer responded, “Try again!” The sequence of correct and incorrect trials and the timing of success or failure feedback were identical for all subjects. In addition, subjects received updated information on their monetary status. In the win condition, their current balance was displayed after correct trials, whereas in the lose condition this display occurred after incorrect trials. At the end of the task, the final balance (52.50 for all subjects) was displayed on the screen.

**Behavioral testing—betting task.** This phase of the experiment utilized the same apparatus as the pretreatment. The sequence of correct and incorrect trials was again identical for all subjects with the graphic following button presses on correct trials and the phrase “You lose” appearing on the screen on incorrect trials. Unlike the pretreatment, subjects did not receive information about monetary status until all trials were completed.

To eliminate the possibility that the presence of the experimenter might influence subjects’ betting performance, a program was designed to allow subjects to enter their bets directly into the computer. Prior to each trial, the sentence “When you have decided how much you would like to bet, press Button 1” appeared on the terminal. Following the button press, either the lowest betting level (0) or the highest betting level (50) was displayed, with the instruction, “Press Button 1 to increase (decrease) your bet. When the amount you would like to bet appears on the screen, press Button 2.” The initial level presented was counterbalanced across trials. Each press of Button 1 resulted in unidirectional increases or decreases of 5$. If a subject pressed Button 1 after the opposite betting limit had been reached, the number on the screen returned to the original level, with instructions indicating that a limit had been reached. After the Button 2 press, the display read, “Your bet of ______ has been entered. Proceed with your task.” As in the pretreatment, the beginning of each trial was signaled by the cue “Button 1 Button 2” on the monitor.

**Procedure**

Upon entering the experimental room, subjects were seated at a large table with the monitor and response manipulandum off to one side. Subjects were asked to sign a consent form which indicated that the experiment involved money. While subjects completed the personality questionnaires, the experimenter returned and gave them the following introduction to the task:

This is a problem-solving experiment, and your task is to learn how to make a picture appear on the screen in front of you. Each time the screen reads “Button 1 Button 2,” this means the start of a new trial. On each trial you have the choice of pressing Button 1 or Button 2. Your task is to try to determine when to press Button 1 and when to press Button 2 to make the picture appear. [The experimenter then described the reinforcement contingencies. For the win pretreatment, this paragraph read:]

You will start with no money. On each successful trial you will earn 25 cents. Alternatively, on each unsuccessful trial you will lose any money. Every time your earnings change, your new balance will appear on the screen. At the end of the task, you will get to keep all of the money you have earned. So, in general, the more successful you are in producing the picture, the more money you will earn.

The paragraph for the lose pretreatment was as follows:

You will start with 5 dollars. On each unsuccessful trial you will lose 25 cents. Alternatively, on each successful trial you will not lose any money. Every time your earnings change, your new balance will appear on the screen. Of course, the maximum amount of money you can lose is 5 dollars. At the end of the task you will get to keep whatever money you have left. So, in general, the more successful you are in producing the picture, the more money you will have left at the end.

After ensuring that subjects understood the task, the experimenter informed them that there would be 20 trials, and asked: “On what percentage of the trials do you feel you’ll be able to make the picture appear?” The experimenter then turned up the contrast on the monitor, which read, “Press Button 1 when you are ready to start!” and left the room.

When the 20 trials had been completed, the experimenter entered the room, informed subjects that they will be repeating the task, and again asked subjects for an estimate of expected success. After obtaining this second estimate, the experimenter said:

The task will be a little different this time, because you will win or lose money, depending on whether or not you produce the picture, and you will determine the amount that you can win or lose on the trials. You will be using the money you’ve earned in this experiment to make your bets, and you will get to keep whatever money you have at the end. Your betting amount can be anything from 0 to 50 cents, in increments of 5 cents. If you run out of money before the trials are up, we will stop. There will be 10 trials. Okay, let me show you how to enter the bet. How much would you like to bet per trial on these 10 trials?

The experimenter obtained the subject’s immediate choice of betting level, then slowly demonstrated the procedure for entering the bet into the computer (see description of betting task for details). The screen went black after the fixed betting level was entered and, at this point, subjects were informed that they could enter a bet before each trial, and that their bets could vary from 0 to 50 cents on each trial. The experimenter again explained the mechanics of entering the bets indicating that the initial number on the screen would be 0 on some trials and 50 on others, and that they would be informed of their overall earnings after the 10 trials were completed. When the subject clearly understood the instructions, the experimenter left the room and the betting task was begun. Following the betting task, and the questionnaire concerning the tasks (see the Apparatus section), subjects received the judgment of control scale with the following instructions:

This scale is kind of a guideline. I’d like you to rate the degree to which you could make the picture occur, with 100 meaning you could
totally determine when the picture would occur, and 0 meaning you
could not at all determine when the picture would occur. Finally, sub-
jects were debriefed, paid, and given their experimental credit points.

The four dependent measures were subjects' expectancy change (the
difference between the initial and posttreatment estimates of expected
success); the fixed betting level obtained immediately after the pretreat-
ment; the mean bet, averaged over 10 trials; and the judgment of control.

Results

Overview

Analysis of variance (ANOVA) yielded no significant experi-
menter effects on any of the dependent measures, and this factor
was dropped from subsequent analyses. A two-factor (Groups ×
Pretreatment) multivariate analysis of variance (MANOVA) was
conducted on the four dependent measures. This analysis yielded
significant effects for extraversion, $F(4, 93) = 2.49, p < .05$, and
for the interaction of extraversion with pretreatment, $F(4, 93) =
3.77, p < .007$. There was no main effect for pretreatment, $F(4, 93) =
1.51, ns$. As predicted, the MANOVA demonstrated a con-
sistent pattern of results with significant Groups × Pretreatment
interactions on all four measures. As illustrated in Figures 1–3,
the scores of extraverted subjects are higher following pretreat-
ment with noncontingent punishment than following pretreatment
with noncontingent reward. Conversely, introverts' scores
are lower following pretreatment with noncontingent punishment relative to introverts' scores following noncontingent reward. Al-
the initial estimate of anticipated success), $F(1, 96) = 3.94, p = .05$. Planned comparisons demonstrated no differences between subject groups following the reward pretreatment, but following the punishment pretreatment, as expected extraverts increased their estimates and introverts decreased expectancy, resulting in a significant difference between the two groups ($t(96) = 2.06, p < .05$). In addition, a Groups X Pretreatment ANOVA was conducted on the pretreatment estimate to rule out the possibility that initial differences in this “baseline” estimate could influence the expectancy change scores. No significant differences were found. Furthermore, the results obtained using an analysis of covariance on subjects’ second estimate, with their first estimate as a covariate, lead to the same conclusion. The planned comparison of introverts’ and extraverts’ scores following the punishment pretreatment was significant, $t(95) = 2.33, p < .05$.

### Betting Measures

The MANOVA revealed a significant Groups X Pretreatment interaction for the fixed betting level, $F(1, 96) = 7.5, p < .01$, and for the actual wagers, averaged over 10 trials, $F(1, 96) = 4.17, p < .05$. In addition, a significant main effect for extraversion was obtained on the mean bet, $F(1, 96) = 5.51, p < .025$. Planned comparisons conducted to aid in interpretation of these effects, yielded only one significant difference between groups for both fixed betting level and mean bet. Following noncontingent punishment, extraverts selected a significantly higher betting level relative to introverts, $t(96) = 2.87, p < .01$, and then proceeded to enter significantly higher wagers across the 10 trials of the task, $t(96) = 3.09, p < .01$. There were no differences between extraverts and introverts on either of these two measures following the reward pretreatment.

### Judged Control

Analysis of the judgment of control measure yielded significant main effects for pretreatment, $F(1, 96) = 5.45, p < .025$, and for groups, $F(1, 96) = 4.94, p < .05$, and a significant interaction, $F(1, 96) = 9.02, p < .01$. Comparisons revealed no significant differences between extraverted groups exposed to the reward and punishment pretreatments or between introverts and extraverts exposed to the reward punishment. All significant effects were due to the very low judgment of control provided by introverts following pretreatment with punishment. This estimate was significantly lower than introverts exposed to the reward pretreatment, $t(96) = 3.69, p < .001$, and than extraverts exposed to the punishment pretreatment, $t(96) = 3.77, p < .001$.

### Questionnaire Measures

Because the questionnaire measures were primarily descriptive and exploratory, those that were conceptually similar were grouped and multivariate analyses were conducted.

**Pretreatment.** One MANOVA was conducted with groups and pretreatment as the independent variables, and the “attribution” measures pertaining to the pretreatment as the dependent variables. This analysis yielded no significant effects. A similar analysis on the rating of “emotional reactions” also yielded no significant effects, though the interaction of Groups X Pretreatment obtained borderline significance, $F(5, 92) = 2.04, p = .08$. As there are numerous potential comparisons, these results should be interpreted with caution. However, inspection of the means (Table 2) suggests that extraverts tended to rate the punishment pretreatment more positively than introverts—a difference not apparent in the reward pretreatment.

**Betting task.** MANOVA (Groups X Pretreatment) on subjective ratings of emotional reactions to the betting task yielded a significant effect for pretreatment, $F(4, 93) = 3.28, p < .025$. Analyses revealed that following pretreatment with noncontingent punishment, subjects rated the subsequent betting task as more disappointing, $F(1, 96) = 12.48, p < .001$, and more frustrating, $F(1, 96) = 4.08, p < .03$, than those subjects who experienced noncontingent reward. Similar analysis using the attribution measures as dependent variables yielded no significant effects.

**Additional personality questionnaires.** Because of their potential significance to the interpretation of our findings, we investigated the relation of Schalling’s measure of psychic anxiety, the neuroticism scale of the EPQ, and the Socialization scale to the dependent measures by dividing subjects into high and low scorers on each of the scales. These three sets of analyses resulted in no significant main effects or interactions for any of the dependent measures. Furthermore, there was no significant extraversion by neuroticism interaction for any of the dependent measures.

### Discussion

The results of this study provide consistent support for the hypothesis that introverts and extraverts differ in their expectations for success following pretreatment with noncontingent punishment. Thus, the investigation extends to the cognitive realm previous findings that the goal-oriented behavior of extraverts is more resistant to alteration by punishment than the goal-oriented behavior of introverts (e.g., Newman & Kosson, 1984; Tiggemann et al., 1982). As predicted, introverts and extraverts exhibited significant differences on each of the four de-

<table>
<thead>
<tr>
<th>Group</th>
<th>Expectancy change</th>
<th>Fixed betting level</th>
<th>Average betting level</th>
<th>Judged control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punishment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraverts</td>
<td>M = 6.24</td>
<td>28.60</td>
<td>32.14</td>
<td>53.80</td>
</tr>
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<td></td>
<td>SD = 12.64</td>
<td>14.25</td>
<td>9.34</td>
<td>11.02</td>
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<tr>
<td>Introverts</td>
<td>M = -1.52</td>
<td>18.80</td>
<td>24.36</td>
<td>38.80</td>
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<td></td>
<td>SD = 11.91</td>
<td>10.33</td>
<td>9.97</td>
<td>18.94</td>
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<tr>
<td>Reward pretreatment</td>
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<td>22.00</td>
<td>29.10</td>
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<td>Extraverts</td>
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</tr>
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<td>25.40</td>
<td>28.56</td>
<td>54.12</td>
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<tr>
<td></td>
<td>SD = 12.82</td>
<td>12.49</td>
<td>8.82</td>
<td>15.02</td>
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</table>
dependent measures following pretreatment with noncontingent punishment but not following pretreatment with noncontingent reward. In comparison to introverts, extraverts exposed to a 50% level of noncontingent punishment exhibited increased expectations for success, placed larger wagers on their ability to succeed, and maintained a belief in the efficacy of their responses (judgments of control).

Despite the consistent differences exhibited by introverts and extraverts following noncontingent punishment, the symmetry of the Groups × Pretreatment interactions observed in this study is not completely consistent with the notion that extraverts are unresponsive to punishment (e.g., Gray, 1972). Like introverts, extraverts appeared to be affected by pretreatment with noncontingent punishment. However, introverts exposed to the punishment pretreatment yielded mean scores that were more pessimistic than introverts receiving the reward pretreatment on all four measures, whereas the ratings of extraverts receiving the punishment pretreatment were more optimistic in all four cases.

On the expectancy change measure, for example, extraverts increased their performance expectation more than six percentage points following pretreatment with noncontingent punishment—a change considerably larger than the two percentage point decrease exhibited by introverts. For the fixed betting level measure, extraverts bet an average of 7% more and introverts an average of 7% less following punishment than their respective controls exposed to noncontingent reward. On the other hand, the magnitude of the difference was greater for introverts on the average betting level and judgment of control measures. Although extraverts exposed to the punishment pretreatment did not differ significantly from extraverts exposed to the reward pretreatment, the consistency of this difference across measures and the fact that the magnitude of the increases observed in extraverts were comparable to the magnitude of the decreases observed in introverts suggest that "insensitivity to punishment" may be an inaccurate characterization of extraverts (see Figures 1-3). Rather, the results suggest to us the possibility that punishment may have equally important, although different, effects on the behavior of introverts and extraverts; reducing the approach behavior of introverts and facilitating the behavior of extraverts.

Typically, speculation regarding syndromes of disinhibition such as psychopathy and extraversion has focused on the absence of a response to punishment rather than on the possibility that a unique reaction to punishment may be a crucial component of these syndromes. However, recent findings in our laboratory support the current results in their demonstration of a distinctive reaction to punishment among extraverts engaged in reward seeking behavior. On two other tasks involving the opportunity to win money, we have found that in contrast to introverts, extraverts exhibit a paradoxical increase in speed of responding on trials following punishment (Newman & Kossen, 1985; Nichols & Newman, in press). If subsequent research continues to support the existence of unique reactions to punishment among introverts and extraverts, then it may be useful to replace the unidimensional notion of "sensitivity to punishment" with one that stipulates separate components of individuals' reactions to punishment.

Regarding potential components of individuals' reactions to punishment, Gray's neuropsychological theory of anxiety is of particular interest. According to Gray (1982), the septo-hippocampal region of the brain mediates the functioning of an hypothetical anxiety system which is activated by cues for punishment and nonreward. Once activated, the system acts to inhibit ongoing behavior, analyze environmental stimuli, and produce an increase in "nonspecific arousal" (Gray, 1982, p. 13). Thus, activation of the anxiety system not only suspends ongoing behavior but it prepares the organism for its reaction to the interruption by the addition of information about the environment and by an increment in arousal that serves to increase the vigor of whatever behavior is eventually emitted (see also, Fowles, 1982).

### Table 2

**Means and Standard Deviations for Questionnaire Items on Treatment Task**

<table>
<thead>
<tr>
<th>Item</th>
<th>Punishment pretreatment</th>
<th>Reward pretreatment</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Extraverts</td>
<td>Introverts</td>
</tr>
<tr>
<td>Enjoyable*</td>
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<td></td>
</tr>
<tr>
<td>$M$</td>
<td>6.24</td>
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<td>$SD$</td>
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<td>1.66</td>
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<tr>
<td>Frustrating*</td>
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</tr>
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</tr>
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<td>$SD$</td>
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<td>$SD$</td>
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<tr>
<td>Interesting*</td>
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</tr>
<tr>
<td>$M$</td>
<td>6.12</td>
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</tr>
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<td>$SD$</td>
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<td>External-Internal*</td>
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<td>$M$</td>
<td>4.25</td>
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<td>2.22</td>
</tr>
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</table>

* Rated on an 8-point scale, 1 = not at all, 8 = very.

b The higher the score, the more the subject believed the cause was due to self.

* The higher the score, the more the subject believed the cause would always be present on tasks like this.

* The higher the score, the more the subject believed the cause influences his performance in all learning situations.

* The higher the score, the more the subject believed the cause influences all areas of his life.

2 On the basis of psychophysiological data, Hare (1978) has proposed that psychopaths may be characterized by a "defensive coping response" in anticipation of aversive event. Although his hypothesis involves a unique and important component of psychopaths' reactions during anticipation of punishment, it is similar to other "insensitivity" accounts because the outcome of the hypothesized defensive response is "to attenuate aversive sensory input and to reduce anticipatory fear" (p. 137).
EXPECTATIONS FOLLOWING PUNISHMENT

Although we are concerned primarily with introverts’ and extraverts’ reactions to noncontingent punishment and not with the development of learned helplessness per se, the learned helplessness literature provides a valuable perspective on individuals’ reactions to noncontingent punishment. The symptoms of helplessness are theorized to occur when an individual perceives noncontingency in a situation involving objective noncontingency, and then develops an expectancy of future noncontingency, which generalizes to situations where responses and outcomes are related (Abramson, Seligman, & Teasdale, 1978; Roth, 1980). In the present study, introverts exposed to pretreatment with noncontingent punishment showed lowered perception of control. Extraverts, however, showed similar judgments of control across pretreatment conditions. The fact that extraverts did not decrease their judgments of control, and that they increased their expectancies for success following noncontingent punishment, suggests that they did not perceive the noncontingent nature of the situation. Wortman and Brehm (1975) state that the person who has a strong expectation of control, due to a history of experience with control, will persevere in spite of noncontingent outcomes, and will need longer exposure to become helpless. Thus, the finding of a differential reaction to noncontingent punishment may reflect different expectancies concerning controllability. That is, extraverts may have a higher expectation for control and may require more exposure to noncontingency before perceiving their lack of control, whereas the amount of noncontingent punishment in the punishment pretreatment appears to have been sufficient to elicit the perception of noncontingency in introverts. Consistent with this account is the fact that introverts and extraverts reported different levels of perceived control in our experiment but did not in the experiment reported by Tiggemann et al. (1982). In the study by Tiggemann et al., subjects were exposed to more noncontingent trials than in the present study and introverts and extraverts were found to give similarly low ratings of perceived control.

Still another interpretation of the persistent expectation of success exhibited by extraverts relative to introverts has been proposed by Tiggemann et al. (1982). Despite similar ratings of perceived control among introverts and extraverts exposed to inescapable noise, introverts nevertheless displayed significantly more inhibition of responding during the test phase of their study. As a result, they proposed that extraverts are resistant to the effects of noncontingent punishment not because they fail to perceive noncontingency (or differ in attributional style) but because they are “geared to respond” and therefore learn response inhibition more slowly than introverts.

Our interpretation of the differences exhibited by introverts and extraverts in this experiment overlaps substantially with the other explanations that we have considered but differs from them in its focus upon the interaction of approach behavior and reaction to punishment. According to our explanation, extraverts persist in goal-oriented behavior relative to introverts, not because they are hyporeactive to punishment per se or prone to overresponding in general, but because their exaggerated approach responding (i.e., perseveration) serves to alter their reaction to punishment from response inhibition to response facilitation. This explanation is quite similar to the notion of enhanced expectation of control advanced by Wortman and Brehm (1975), but it has the added advantage of explaining extraverts’ learning deficits (i.e., difficulty learning to inhibit punished responses), as well as their tendency to persist in the face of frustration (Newman et al., 1985; Newman & Kosson, 1984, 1985).

In summary, the current findings demonstrate that introverts and extraverts differ in their cognitive/emotional response to punishment as well as in their behavioral response to punishment. In addition, the results suggest that extraverts’ resistance to interruption may result in a “paradoxical” reaction to punishment involving response facilitation as opposed to response inhibition. Finally, these findings are consistent with recent physiological models of disinhibited behavior (e.g., Gray, 1972, 1982; Gorinstein & Newman, 1980) and raise hope that these models may be useful for unravelling the complex issues surrounding individual differences in reaction to punishment and frustration.

3 In fact, owing to the complexity of the behaviors elicited by the task, the results are open to a variety of interpretations. However, our purpose in using these complex measures was not to provide an account of behavior or expectation of success in general, but to examine ways in which extraverts’ distinctive reaction to punishment may relate to their cognitive style. In so doing, we assumed that a subject’s emotional reaction to punishment and cognitive style are interrelated but made no attempt to establish that one level of analysis provides a more compelling explanation of the behavior observed.

References


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