

## Response Perseveration in Psychopaths

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Prison psychopaths and nonpsychopaths performed a card-playing task involving monetary rewards and punishments under three conditions. In all conditions, the probability of punishment increased by 10% with every block of 10 cards from 10% to 100%. The dependent measure—number of cards played before terminating the task—provided a measure of response perseveration. As predicted, psychopaths played significantly more cards (and lost more money) than did nonpsychopaths when the task involved immediate feedback only. Although providing subjects with a display illustrating their cumulative response feedback did little to reduce this deficit, there were no group differences apparent when cumulative feedback was accompanied by a 5-s waiting period during which subjects were prevented from making another response. The results suggest that procedures designed to reduce psychopaths' maladaptive perseveration by imposing a delay between response feedback and the next opportunity to respond may prove clinically important.

Psychopathic behavior has been described as callous, egocentric, and lacking in forethought. Furthermore, psychopaths display a near total disregard for the negative consequences of their behavior. Although their disregard for the rights and feelings of others could be explained by a failure of socialization, this account does not explain psychopaths' apparent disregard for their own well-being. Rather, psychopaths' lack of insight into their self-defeating behavior has suggested to many that they are relatively unable to learn from their mistakes (e.g., Cleckley, 1964). Laboratory studies provide additional evidence that psychopaths experience difficulty learning to inhibit responses that have resulted in punishment (see Blackburn, 1983). Although this deficit might reflect a general inability to learn from punishment related to poor fear conditioning or lack of motivation to avoid punishment, recent evidence suggests that psychopaths' deficient avoidance learning is not apparent under all circumstances (e.g., Newman & Kosson, 1986; Schmauk, 1970; Siegel, 1978).

An alternative account of psychopaths' failure to inhibit punished responses proposed by Gorenstein and Newman (1980) is that psychopaths are prone to response perseveration. Following McCleary (1966), perseveration was defined as the tendency to continue a response set for reward despite punishment or changes in environmental contingencies that reduce the adaptiveness of continued responding. Thus, the concept of perseveration places subjects' reaction to punishment and avoidance learning within the context of its interaction with reward-seeking

behavior (see also Fowles, 1980; Gray, 1971, 1982). More specifically, we proposed that once psychopaths adopt a response set for reward, they have difficulty attending to competing response contingencies (Newman, Widom, & Nathan, 1985).

Studies designed to assess response perseveration in psychopaths and other disinhibited individuals have yielded mixed results (e.g., Gorenstein, 1982; Hare, 1984; Waid & Orne, 1982). However, none employed concrete incentives. Our original formulations concerning response perseveration in psychopaths emphasized the importance of reward for observing perseveration in psychopaths (Gorenstein & Newman, 1980), and recent evidence reinforces the importance of motivational factors (Newman & Howland, 1986; Newman & Kosson, 1986; Newman et al., 1985). On the other hand, our investigations of response perseveration have assessed subjects' ability to modulate (and occasionally withhold) responding in accord with discriminative stimuli on a trial-by-trial basis but—unlike traditional assessments of response perseveration—have not required subjects to extinguish their original response set completely.

Although not designed to assess perseveration, one additional experiment (Siegel, 1978) is clearly relevant. Subjects were provided an opportunity to play as many cards as they wished from 11 decks of playing cards that varied in the probability of punishment (vs. reward) from 0% to 100%. Although the group differences were not significant at the extreme probabilities of punishment, psychopaths played more cards than controls did at every level of punishment. These data provide evidence that psychopaths are more likely to respond persistently in situations that provide immediate rewards and punishments. However, because the probability of winning and losing did not vary within a deck of cards, these data provide little information about psychopaths' ability to modulate their response set in accord with changing environmental circumstances. In addition, it seems likely that the low rate of reward in the 90% and 100% punishment decks was not sufficient to ensure the formation of a dominant response set for reward.

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Thus, although several studies indicate that psychopaths are persistent in reward-seeking behavior and deficient in response modulation, no study to date has assessed their ability to alter a response set for reward as changing response contingencies transform a previously adaptive (i.e., rewarded) response set into a maladaptive one. To provide such an assessment, we employed a modified version of Siegel's (1978) card-playing task. The task involved only one deck of 100 cards, and the probability of punishment increased linearly by 10% with each successive block of 10 cards. An initial high rate of reward (90%) was used to establish a dominant response set that subjects would need to alter as the card-playing response became more often punished than rewarded. We predicted that psychopaths would play significantly more cards than nonpsychopathic controls. Furthermore, to distinguish such response perseveration from adaptive response persistence, we analyzed data on subjects' earnings. We predicted that psychopaths would earn significantly less money than nonpsychopaths.

The second purpose of this experiment was to explore manipulations that might reduce response perseveration in psychopaths. One manipulation involving a cumulative display of subjects' response feedback was suggested by research (Gullick, Sutker, & Adams, 1976; Painting, 1961) and theory (Hare, 1970) indicating that psychopaths appear to have difficulty associating events that are separated in time. We anticipated that cumulative feedback, illustrating how the probability of punishment was changing, would reduce the need to integrate feedback over time and help subjects to abandon their reward-seeking behavior at a more appropriate time. A second manipulation involved forcing subjects to wait for a brief time following response feedback. This procedure was based on recent research indicating that psychopaths and other disinhibited subjects are less likely than controls to pause after receiving negative feedback and that failure to pause following punishment is related to poorer learning from punished errors (Newman & Howland, 1986; Patterson, Kosson, & Newman, 1987). We reasoned that forcing subjects to pause after response feedback would improve their use of information about the changing probability of punishment and would reduce perseveration.

## Method

### Subjects

Thirty-six psychopaths and 36 controls were selected from White male inmates at a minimum security prison in Oregon, Wisconsin, by means of Hare's (1980) 22-item Psychopathy Checklist. Hare (1980) and others (Kosson, Nichols, & Newman, 1986; Schroeder, Schroeder, & Hare, 1983) have provided substantial evidence that the psychopathy checklist is both a reliable and valid measure of psychopathy for incarcerated White men. Interrater reliability in our research has approached the levels reported by Hare and his colleagues, averaging .84 during the first 2 years of our project (see Kosson et al., 1986, for more details). Subjects whose psychopathy scores averaged 31.5 or greater were designated psychopaths, and those whose scores averaged 20 or less were designated nonpsychopaths. Subjects were excluded from the study if they were over 40, had borderline or lower intelligence as measured by the Shipley Institute of Living Scale (Shipley, 1940) or as noted in the institution files, displayed any evidence of psychosis, or took psychotropic medications. Group means for psychopaths and nonpsycho-

paths were 34.21 ( $SD = 2.47$ ) and 15.61 ( $SD = 3.31$ ), respectively, for psychopathy ratings; 109.22 ( $SD = 9.15$ ) and 109.21 ( $SD = 8.04$ ) for intelligence ( $t < 1.0$ ); and 25.53 ( $SD = 4.92$ ) and 26.72 ( $SD = 6.02$ ) for age ( $t < 1.0$ ).

All subjects in this experiment had participated in one or more behavioral tasks prior to this one. The card perseveration task was always performed, in counterbalanced order, with a computerized version of the Wisconsin Card Sorting Task (Newman & Howland, 1986). Subjects were randomly assigned to perform the card-playing task under one of three conditions, with the constraint of filling each of six cells (2 groups  $\times$  3 conditions) as quickly as possible. The male experimenter was unaware of subjects' psychopathy status.

### Procedure

All subjects meeting selection criteria were contacted about participating in a study involving a 1-hr interview and several computer-controlled behavioral tasks that provided an opportunity to earn money. Subjects were paid \$3 for the interview and were contacted again usually within 2 to 8 weeks to perform the behavioral tasks.

The 100 cards in the deck were presented via an Apple II-Plus computer and Sanyo color monitor in a prearranged order of face cards and number cards. At the beginning of each trial, a rectangle (3.1 cm wide  $\times$  3.5 cm high) appeared on the screen with a large question mark in the center; the words DO YOU WANT TO PLAY? were printed over the rectangle. On every trial, subjects had two choices: to play the next card or quit the game. To play, subjects pressed the first of four buttons mounted on the top of a plastic box (15  $\times$  8  $\times$  5.8 cm). After each play, the question mark in the rectangle was replaced with an uppercase letter that represented one of the cards (i.e., J, Q, K, or A, for Jack, Queen, King, or Ace) or an integer (i.e., 2-10) and the appearance of the words YOU WIN! or YOU LOSE! above the rectangle. To quit, subjects pressed the second button. Subjects began the task with 10 chips, each worth 5¢, and were instructed to play as many cards as they wished. The experimenter read instructions informing subjects how to play a card and how to quit the game and also informed subjects that the task did not involve a standard deck of playing cards so that they could not predict how many of each card would appear. The experimenter gave and took away chips as the subject won and lost. Subjects won 5¢ whenever a button press was followed by a face card (i.e., J, Q, K, A), and they lost 5¢ whenever a number card appeared. The probability of losing (i.e., getting a number card) increased by 10% with every block of 10 cards from 10% to 100%. The dependent measure was the number of cards played before quitting. In addition, we recorded the amount of money that each subject won or lost during the task.

Except for the defining characteristics, all three experimental conditions were identical. In Condition I, subjects could respond to the next card as quickly as they wished and received *immediate* feedback only (i.e., the computer-delivered message and the addition or subtraction of a poker chip). Condition IC was identical to Condition I except that subjects in Condition IC received *cumulative* as well as immediate feedback. That is, after each play, the letter or number that had appeared inside the rectangle was rewritten at the top of the monitor. These letters and numbers, which were 0.5 cm high, appeared in rows of 10 across and remained visible throughout the task. Condition ICW was identical to Condition IC with the exception that the rectangle with the question mark and the words DO YOU WANT TO PLAY? did not appear until 5 s after the feedback for the prior play (i.e., after a 5-s wait).

## Results

A three-way analysis of variance (ANOVA) with group, condition, and order as between-subjects variables was conducted to

assess the effect of the counterbalancing variable (order) on number of cards played and amount of money earned. Because none of the main effects or interactions involving order of task administration was significant, this variable was dropped from subsequent analyses.

### *Number of Cards Played*

The mean numbers of cards played by psychopaths and controls were 89.6 ( $SD = 16.9$ ) and 62.8 ( $SD = 27.9$ ), respectively, in Condition I; 80.8 ( $SD = 24.6$ ) and 61.8 ( $SD = 24.5$ ) in Condition IC; and 48.4 ( $SD = 31.9$ ) and 48.3 ( $SD = 21.6$ ) in Condition ICW.

Hypotheses were tested using planned comparisons. To test the first hypothesis, we compared the mean number of cards played by psychopaths and controls in Condition I. As predicted, psychopaths played significantly more cards than controls did,  $t(66) = 2.62, p < .02$ . Second, we examined the Group  $\times$  Condition interaction involving Conditions I and IC to test the hypothesis that providing subjects with cumulative feedback would reduce psychopaths' relative perseverative deficit. Contrary to prediction, the interaction was not significant,  $t(66) < 1.0$ . Finally, we tested the Group  $\times$  Condition interaction involving Condition I and ICW to test the hypothesis that an enforced wait in conjunction with cumulative feedback would reduce the group difference in response perseveration. Consistent with prediction, the interaction was significant at the .02 level,  $t(66) = 2.61$ .

Additional information is provided by the overall ANOVA. This analysis yielded significant effects for group,  $F(1, 66) = 6.72, p < .02$ , and condition,  $F(2, 66) = 8.48, p < .001$ . Contrary to prediction, the Group  $\times$  Condition interaction was not significant,  $F(2, 66) = 1.81$ , providing further evidence that the reduction of response perseveration in psychopaths was specific to Condition ICW.

### *Amount of Money Earned*

The mean earnings for psychopaths and controls were 41¢ ( $SD = .56$ ) and 99¢ ( $SD = .52$ ), respectively, in Condition I; 59¢ ( $SD = .57$ ) and \$1.06 ( $SD = .38$ ) in Condition IC; and \$1.09 ( $SD = .44$ ) and \$1.27 ( $SD = .26$ ) in Condition ICW.

Planned comparisons were conducted to test the specific hypotheses. As predicted, psychopaths earned significantly less money than controls did in Condition I,  $t(66) = 3.02, p < .01$ . Although the Group  $\times$  Condition interaction involving Condition IC was not significant,  $t(66) < 1.0$ , the Group  $\times$  Condition interaction involving Condition ICW was significant,  $t(66) = 2.09, p < .05$ . Thus, in addition to reducing group differences in number of cards played, the wait plus cumulative feedback employed in Condition ICW reduced group differences in the amount of money earned.

To provide additional information, the results of the two-way ANOVA for money earned are also reported. This analysis yielded significant main effects for group,  $F(1, 66) = 13.74, p < .001$ , and condition,  $F(2, 66) = 6.70, p < .005$ , but the Group  $\times$  Condition interaction was not significant,  $F(2, 66) = 1.20$ .

## Discussion

The results of this study provide unambiguous evidence of response perseveration in psychopaths. Whereas controls had little difficulty noticing the steady increases in the probability of punishment and adjusting their responding accordingly, psychopaths failed to alter their dominant response set for reward. In fact, 9 of the 12 psychopaths in the immediate feedback condition never quit (i.e., played the entire deck of 100 cards), despite losing money on 19 of the last 20 trials.

Moreover, psychopaths' response persistence was maladaptive and resulted in their earning significantly less money than controls. This finding is noteworthy in light of results reported by Schmauk (1970) suggesting that psychopaths are especially motivated to avoid loss of money. Though statistically significant, group differences of less than \$1 may not seem monetarily significant. However, even small amounts of money are apt to be meaningful in a prison economy in which sources of income are relatively scarce and the minimum wage is 15¢ per hour. Also, subjects who responded excessively and saw their earnings first increase and then decrease appeared genuinely bothered by the outcome and often verbalized self-recriminations (e.g., "I should've quit when I had all those chips").

Beyond demonstrating response perseveration in psychopaths, a second goal of this experiment was to explore condition manipulations that might reduce their perseverative deficit. In contrast to the manipulation involving the cumulative display alone, which was relatively ineffective in reducing perseveration in psychopaths, the Group  $\times$  Condition interaction involving Condition ICW indicates that the combination of a 5-s pause together with cumulative feedback significantly reduced their perseverative deficit. In fact, the mean number of cards played by psychopaths and controls in Condition ICW indicates that both groups terminated the game when monetary punishments became as frequent as monetary rewards. Despite the fact that postfeedback delays were effective in reducing psychopaths' response perseveration, the possibility remains that a difference between groups would have emerged if our control condition involving response prevention plus feedback had not led to near-optimal performance for both groups. Thus, future research should attempt to match experimental conditions for difficulty level to rule out the possibility that a "floor effect" rather than the feedback manipulation is responsible for the absence of group differences seen in Condition ICW.

Finally, the rationale for imposing a 5-s interval between response feedback and the presentation of the next opportunity to respond was to interrupt psychopaths' response set and increase their use of the response feedback. However, the task afforded no direct measure of subjects' response set or attention to response feedback. Although such inferences are necessarily speculative, a series of studies in our laboratory has demonstrated a relation between the length of time subjects pause after punishment and their ability to profit from punished errors. Whether the pause is imposed by the experimental procedure or is the result of intrinsic differences in response style, longer pauses after negative feedback are associated with better modulation of behavior in accord with response feedback (Newman & Howland, 1986; Newman, Patterson, & Howland, 1986; Patterson et

al., 1987). In conclusion, whether such manipulations have a selective impact on psychopaths or improve the performance of nonpsychopaths as well, interventions that reduce psychopaths' maladaptive perseveration by imposing a delay between response feedback and the next opportunity to respond may prove clinically important.

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