Passive Avoidance Learning in Psychopathic and Nonpsychopathic Offenders

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Research on passive avoidance learning has demonstrated reliable differences between psychopaths and controls when avoidance errors result in electric shock but not in loss of money (Schmauk, 1970). Using monetary punishments, Newman, Widom, and Nathan (1985) found that psychopathic delinquents performed more poorly than controls in an experimental paradigm employing monetary reward as well as the avoidance contingency. The present study was conducted to replicate and extend these findings using adult psychopaths and a computer controlled task. Sixty white male prisoners were assigned to groups using Hare's (1980) Psychopathy Checklist and administered a "go/no-go" discrimination task involving monetary incentives. One condition entailed competing reward and punishment contingencies; the other, two punishment contingencies. As predicted, psychopaths made significantly more passive avoidance errors than nonpsychopaths when the task contained competing goals ($p < .05$) but performed as well as controls when the subjects' only goal was avoiding punishment. Results corroborate earlier findings that psychopaths are relatively poor at learning to inhibit reward-seeking behavior that results in monetary punishment.

Passive avoidance learning plays a prominent role in current theories of psychopathic behavior (e.g., Blackburn, 1983; Trasler, 1978). Psychopaths' relatively deficient passive avoidance learning has been demonstrated by several researchers (e.g., Lykken, 1957; Schachter & Latané, 1964; Schmauk, 1970) and is often considered the single most well-established finding on the behavior of psychopaths (e.g., Gorenstein & Newman, 1980; Waid & Orne, 1982).

In contrast to studies demonstrating poorer passive avoidance among psychopathic offenders, Schmauk (1970) reported that psychopaths are capable of performing a passive avoidance task as well as nonpsychopaths. Using the same paradigm in which deficient passive avoidance of electric shock had been demonstrated (Lykken, 1957), Schmauk found that psychopaths avoided tangible punishment (i.e., loss of money) as well as controls. He concluded that psychopaths are not deficient in passive avoidance learning generally but that monetary punishments are more effective than electric shock in mediating avoidance learning in psychopaths.

Alternatively, procedural changes associated with the monetary punishment condition may have made the avoidance contingency more salient and thereby altered the subjects' perception of their task. In Lykken's and Schmauk's studies, the avoid-

ance contingency was a latent task: Subjects were told only to work their way through a mental maze and were never informed that punishment could be avoided. Under such conditions, passive avoidance requires that subjects first become aware that punishments are contingent on specific responses. That only 1 of 10 psychopaths (versus 7 of 10 normal controls) later reported that electric shocks were response contingent (Schmauk, 1970) indicates a failure to alter their initial instructional set. In fact, several authors have characterized the psychopathic deficit as an inability to modulate response sets (e.g., Gorenstein & Newman, 1980; Waid & Orne, 1982). On the other hand, subjects in the tangible punishment condition were provided with $8 in quarters, an elaborate video display, and the additional instruction that they could keep whatever money remained at the end of the study. These procedural changes, combined with the absence of incentives for performance on the manifest task, may have increased psychopaths' attention to, and learning of, the punishment contingency. In this context, it is at least as parsimonious to attribute the absence of group differences in this condition to the relative salience of the punishment contingency as to its motivational relevance. However, the psychopaths' adequate passive avoidance under these circumstances does not imply that they will avoid monetary punishments under all conditions. In particular, when subjects have the opportunity to win as well as lose money, psychopaths may appear insensitive to monetary contingencies that are not part of their initial response set.

Following this logic, Newman, Widom, and Nathan (1985) assessed passive avoidance learning in psychopathic delinquents and controls using a paradigm that provided monetary rewards for responding to positive simuli (S+'s) as well as monetary punishments (i.e., loss of reward) for responding to negative stimuli (S−'s). To control for nonspecific effects such as motivation and ability to perform the discrimination, a second task

was employed in which subjects earned rewards for responding to S+'s and also earned rewards for withholding responses to S−'s. As predicted, psychopathic subjects committed significantly more passive avoidance errors than controls in the task involving reward and punishment but not in the task involving reward only. Thus, when subjects were provided with the competing goals of avoiding punishment while earning rewards, psychopaths were relatively deficient in avoiding loss of money.

The purpose of this experiment was to extend the findings of Newman et al. (1985) in three ways: first, by investigating task performance in adult psychopaths and nonpsychopaths as opposed to juvenile delinquents; second, by replacing the file card administration employed by Newman et al. with a computerized administration of the task; and third, by using a punishment-only condition to investigate directly whether psychopaths perform a passive avoidance contingency as well as nonpsychopaths in the absence of a salient reward contingency. We predicted that psychopaths would commit more passive avoidance errors than nonpsychopaths when subjects could earn reward as well as incur punishment (Condition R + P) but perform as well as nonpsychopaths when punishment provided the only incentive for correct responding (Condition P).

Method

Subjects

Subjects were 60 white male inmates at a minimum security prison in southern Wisconsin. Potential subjects were obtained by choosing every fifth name on the institution roster, screening out those men described as currently psychotic, receiving psychotropic medication, of borderline or lower intelligence, performing below the fifth grade level on academic achievement tests, or above age 40. Remaining subjects were interviewed and assigned to groups on the basis of their scores on Hare's (1980) Psychopathy Checklist. Hare and others have provided substantial evidence that the Psychopathy Checklist is both reliable and valid for selecting psychopaths for research (see Hare, 1985; Schroeder, Schroeder, & Hare, 1983). Procedures for selecting subjects in this study were identical to those employed by Kosson and Newman (1986). We have presented evidence elsewhere regarding the reliability and validity of these procedures spanning the period of this study (Kosson, Nichols, & Newman, 1985). Our data agree closely with those presented by Hare and his colleagues, with interrater reliabilities exceeding .85. Because there is no evidence regarding the validity of this checklist with black male inmates, the present report concerns whites only, though a replication with black inmates is in progress.

Information obtained from the interview and file review was also used to assign each subject a global rating from 1 to 7, reflecting the extent of his fit with Cleckley's (1964) description of the psychopath as well as the diagnosis from the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III; American Psychiatric Association, 1980) that most adequately described his antisocial behavior. In addition, subjects completed several self-report tests including the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975); the Socialization Scale (Gough, 1960); the Shipley Institute of Living Scale, a short intelligence test (Shipley, 1940); the Welsh Anxiety Scale (Welsh, 1956); and Schalling's (1978) Multicomponent Anxiety Inventory IV and Impulsivity–Monotony Avoidance–Detachment Inventory. Means and standard deviations for psychopaths and controls on each of these measures are reported in Table 1.[1]

Apparatus and Tasks

The experimental task was conducted using an Apple II Plus computer, a Sanyo 13-in. monitor, and a response panel. The response panel was a rectangular, black, plastic box (12 cm × 9.5 cm × 9 cm) with one push button on the top surface of the box. A small enclosed speaker connected to the computer provided auditory feedback. Software for administering stimuli and recording responses was written by the authors.

Two versions of the go/no-go discrimination task were employed, one (Condition R + P) involving reward and punishment (i.e., loss of reward) incentives and one (Condition P) involving punishment only. In each case, subjects were instructed to learn by trial and error when to respond (by pressing the button) and when not to respond. Stimuli were presented for 3 s or until subjects responded. The interstimulus interval was 1 s.

Stimuli consisted of eight two-digit numbers repeated 10 times in different, randomized orders for a total of 80 trials. Numbers ranged from 01 to 99 and were chosen so that no attribute of a number could be associated differentially with either winning or losing; that is, the four S+'s (stimuli paired with reward) and four S−'s (stimuli paired with punishment) were evenly divided with regard to the attributes of above versus below 50 and even versus odd. Each number was presented on the monitor as white light on a dark background and measured 5.1 cm × 2.5 cm in size. Two different sets of eight stimulus numbers were employed as well as two formats for assigning S+ and S− status to numbers. The two formats were achieved by altering programmed feedback so that stimuli that served as S+'s for half of the subjects served as S−'s for the other half. No more than three S+'s or S−'s appeared consecutively.

In Condition R + P, responses to an S+ were reinforced by presentation of a high-pitched tone (625 Hz as estimated by a Tectronix 475a oscilloscope) and the experimenter's adding a chip to the subject's pile of earnings. When a subject responded to an S−, a lower pitched tone (148 Hz) sounded and the experimenter removed a chip from the subject's earnings. No chips were gained or lost when a subject did not respond. Subjects were given 10 chips prior to the start of the task, and each chip was worth 10 cents.

In Condition P, subjects began with 40 chips and could earn no additional money. When subjects either responded to an S− or failed to respond to an S+, the low-pitched tone was sounded and the experimenter withdrew a chip. No feedback was presented following correct responses.

Procedure

After determining that they were eligible to participate, subjects were contacted individually and provided with a description of the entire project. Those consenting to participate were interviewed at that time and paid $3 for completing the interview. A subset of subjects was contacted again and asked to participate in behavioral testing. These subjects signed an additional consent form describing tasks and personality measures. Behavioral testing was generally completed within 6 weeks of the interview. During the first session, subjects completed the discrimination task described above, a second task (described in Kosson & Newman, 1986), and the Shipley Institute of Living Scale. With the exception of the EPQ (administered before the interview), the personality assessment was completed following a second session of behavioral testing. The discrimination task took 12–14 min to complete, and the entire session lasted 45–60 min.

Subjects were randomly assigned to experimental conditions involving the two tasks, two sets of stimuli, and two formats of S+ versus S−

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[1] The significant differences between groups in socialization, psychoticism, and monotony avoidance are consistent with assumed relationships between these constructs and psychopathy, whereas the relationship between psychopathy and anxiety is highly controversial (see Hare & Harpur, 1986; Kosson et al., 1985).

Table 1

Characteristics of Psychopathic and Nonpsychopathic Subjects

Assessment instrument	N	Psychopathic		Nonpsychopathic		p
		M	SD	M	SD	
Psychopathy Checklist	60	34.65	2.92	15.75	3.17	.001
Global rating (1–7)[a]	55	5.76	1.45	2.30	1.00	.001
Age	60	25.77	4.48	26.13	6.03	ns
Intelligence	53	109.89	8.45	107.44	9.20	ns
Extraversion	59	14.80	4.82	13.45	4.82	ns
Neuroticism	59	10.73	5.53	10.35	6.74	ns
Psychoticism	59	5.37	3.01	3.93	2.15	.05
Lie	59	5.97	3.51	7.28	4.09	ns
Socialization Scale	45	23.54	4.83	29.57	6.35	.001
Welsh Anxiety	45	11.29	8.46	10.95	8.47	ns
Psychic Anxiety	45	10.17	5.65	11.38	6.00	ns
Somatic Anxiety	45	6.29	5.71	6.62	5.44	ns
Muscle Tension	45	7.25	5.63	6.57	5.75	ns
Impulsivity	45	16.62	4.61	14.71	3.21	ns
Monotony Avoidance	45	18.42	5.27	14.38	4.12	.01
Detachment	45	14.79	4.31	13.14	4.83	ns
		Psychopathic %		Nonpsychopathic %		
APD, one rater[a]	55	89.7		3.7		
APD, two raters[a]	55	69.0		0.0		

[a] Global ratings and *Diagnostic and Statistical Manual* (DSM-III) diagnoses were made by the same individuals who completed the Psychopathy Checklist and therefore cannot be considered independent of each other. The APD ratings show the percentages of subjects meeting the DSM-III criteria for Antisocial Personality Disorder according to one or two raters.

status within the constraint of obtaining 15 subjects per cell as quickly as possible. Before beginning the discrimination task, subjects received instructions describing the structure of the task, the reinforcement contingencies, and the process of trial and error learning. In addition, subjects received eight practice trials involving four presentations of each of two practice stimuli (01 was an S−; 02 was an S+). The experimenter, blind to subjects' group membership, answered any questions before the start of the task and sat next to subjects during testing to dispense and remove chips. At the conclusion of the session, subjects were informed of their earnings and that the money would be credited to their institutional account. Unfortunately, it was necessary to change experimenters twice during the course of the study. A female experimenter conducted the study for 40 subjects (9 to 11 subjects in each of the four cells). Two male experimenters administered the task to the remaining 20 subjects.

Results

Subjects' performance data were divided into commission errors (failure to inhibit responses to S−'s) and omission errors (failure to respond to S+'s). In this experiment, errors of commission constituted passive avoidance errors. The first block of eight trials was excluded from analyses, because performance could not reflect learning until subjects had viewed each stimulus number at least once. Analysis of variance (ANOVA) revealed no significant main effects or interactions (*p* > .10) for the three counterbalancing variables, sex of experimenter, stimulus set, and format of S+ and S− presentations,[2] with one exception: The main effect for stimulus set approached significance, $F(1, 44) = 3.80, p < .06$. Because the set of stimulus numbers used appeared to affect subjects' performance, it was retained as a covariate in subsequent analyses.

To evaluate the effects of group and condition on the performance data presented in Figure 1, we conducted a 2 (group) × 2 (condition) × 2 (type of error) analysis of covariance with stimulus set as the covariate. This analysis revealed significant effects for condition, $F(1, 55) = 6.26, p < .02$, and for type of error, $F(1, 56) = 15.49, p < .001$, reflecting a tendency for all subjects to perform more poorly in Condition P than in Condition R + P and for subjects to make more commission than omission errors. None of the main effects or interactions involving group approached significance. The Group × Condition × Type of Error interaction yielded $F(1, 56) = 2.51, p < .12$.

To test the hypothesis that psychopaths would perform more poorly than nonpsychopaths in Condition R + P but not in Condition P, planned comparisons were conducted using *t* tests that incorporated both within- and between-subjects error terms as recommended by Kirk (1968). The comparisons employed adjusted means, though these were nearly identical to unadjusted means. For commission errors, the planned comparison revealed a significant Group × Condition interaction, $t(55) = 2.55, p < .025$. As predicted, psychopaths made significantly more commission errors than controls in Condition R + P, $t(55) = 2.11, p < .05$, but did not differ from nonpsychopaths

[2] Because there were three counterbalancing variables in addition to group and condition variables, it was not possible to include all factors in one ANOVA of full rank. Consequently, two separate ANOVAs were employed. The first ANOVA was a four-factor mixed design, with group, condition, and sex of experimenter as between-subjects factors and type of error as a within-subjects variable. The second ANOVA was a five-factor mixed design, with group, condition, format, and stimulus set as between-subjects factors and type of error as a within-subjects factor.
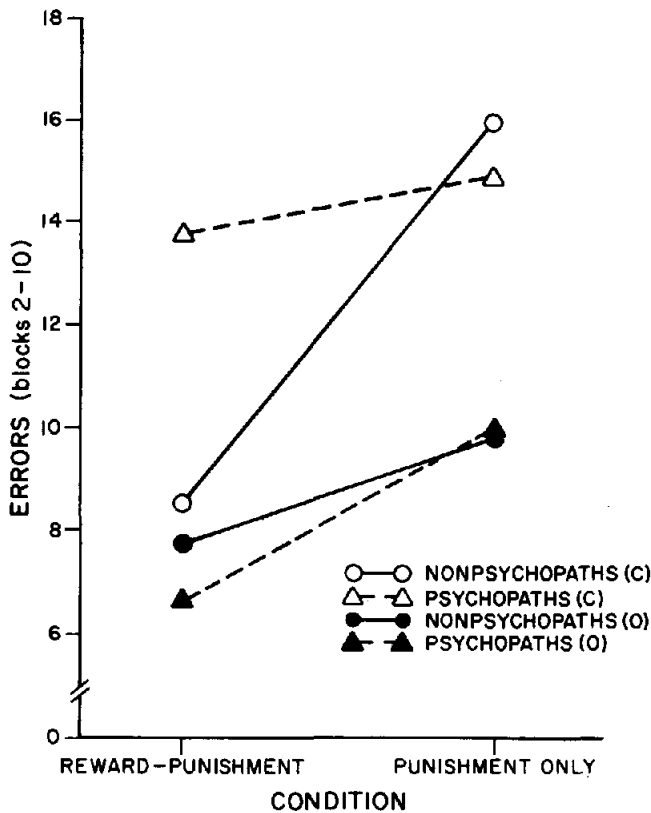
Figure 1. Mean number of commission and omission errors (covariate adjusted) as a function of group and condition.

in Condition P, $t(55) < 1$. Comparable planned comparisons involving subjects' omission errors revealed no significant effects, all ts < 1.

Discussion

The results of this study are partially consistent with experimental hypotheses. As predicted, psychopaths committed more passive avoidance errors than controls on a task involving competing reward and punishment contingencies but performed as well as controls on the same task involving punishment only. These findings are consistent with earlier results obtained with a noncomputerized version of the R + P condition and juvenile delinquent subjects assigned to psychopathic and nonpsychopathic groups using the Psychopathic Deviate and Welsh Anxiety scales of the Minnesota Multiphasic Personality Inventory (Newman et al., 1985). Although the control task in the earlier experiment involved reward only as opposed to punishment only, both control conditions designed to provide subjects with only one goal served to eliminate group differences in passive avoidance learning. Taken together, the results suggest that the superior passive avoidance of control subjects is specific to experimental conditions involving competing approach and avoidance contingencies.

Although elimination of the reward contingency eliminated group differences in passive avoidance learning, this manipulation did not lead to a reduction in passive avoidance errors committed by psychopaths. If, as we proposed, psychopaths' focus on reward interferes with their passive avoidance learning, then psychopaths in Condition P could also be expected to perform better than psychopaths in Condition R + P. The failure to obtain this result was, therefore, contrary to expectation.

The most parsimonious explanation of this result is that the two conditions were not equally difficult, as indicated by the unanticipated main effect for condition. Thus, although Conditions R + P and P involved identical discriminations, it seems likely that alterations of the reinforcement contingencies affected task difficulty. For instance, the use of two punishment contingencies in the latter may have resulted in excessive arousal, led subjects to adopt less efficient strategies for learning, and/or made instructions more difficult to understand. If this interpretation is correct, then changes designed to make Condition P easier should reduce the number of errors equally for psychopaths and nonpsychopaths, producing results more in keeping with predictions. This is, admittedly, a post hoc interpretation, and replication with better matched tasks is needed.

In summary, the results for the reward–punishment condition extend the previous demonstration of a passive avoidance deficit with monetary punishment in juvenile delinquents to adult psychopaths, and they show that this effect can be obtained with computerized administration of the task. The results also replicate the absence of performance differences between psychopaths and nonpsychopaths when experimental conditions involve only one motivationally significant goal: reward in Newman et al. (1985), punishment (loss of money) in the present experiment. Contrary to expectations, psychopaths performed no worse in the reward–punishment condition than in the punishment-only condition, a result tentatively attributed to unanticipated differences in the difficulty of the two conditions.

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