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Passive Avoidance in Syndromes of Disinhibition: Psychopathy and Extraversion

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According to the physiological animal model proposed by Gorenstein and Newman (1980; see also Newman, Gorenstein, & Kelsey, 1983), psychopaths and extraverts may be characterized by a common psychological diathesis related to behavioral inhibition (see also Fowles, 1980; Gray, 1982). One aspect of this diathesis involves deficient passive avoidance learning, which has been central to explanations of "unsocialized" (e.g., Trasler, 1978) and antisocial behavior (e.g., Hare, 1970). Results from three experiments supported our prediction that psychopaths and extraverts would exhibit deficient passive avoidance relative to nonpsychopaths and introverts, respectively. In addition, the passive avoidance deficit was particularly evident in tasks that required subjects to inhibit a rewarded response in order to avoid punishment. The latter finding may be important for explaining the inconsistent results regarding passive avoidance learning in psychopaths (e.g., Chesno & Kilmann, 1975; Schmauk, 1970). Discussion of the results focuses on the importance of reward in mediating the passive avoidance deficit of "disinhibited" individuals and on the existence of an indirect relationship between psychopathy and extraversion: one that is consistent with the observed experimental parallels as well as with the more ambiguous evidence regarding a direct correlation between measures of the two syndromes.

Gorenstein and Newman (1980) proposed that the behavioral syndrome, which results from septal lesions in rats, provides a useful model for human disinhibition, with implications for many individuals who are labeled antisocial, psychopathic, alcoholic, hyperactive, and extraverted. On the basis of striking commonalities between the animal and human syndromes, those authors suggested that equivalent *psychological* processes may be accounting for the notable similarities. Thus they argued that the various syndromes of disinhibition share a common psychological diathesis and that this diathesis may be unmasked through the use of the physiological model.

In exploring the psychological manifestations of septo-hippocampal functioning, Gray has focused on the concepts of introversion–extraversion (1970, 1972) and anxiety (1982). Recently, Gray (1979, 1982) characterized the function of the septo-hippocampal system as the inhibition of ongoing behavior in response to cues for punishment, frustrative nonreward, or novel stimuli and conveniently labeled it the *behavioral inhibition system.* In discussing the implications of Gray's model from a psychophysiological point of view, Fowles (1980) emphasized the association between the behavioral inhibition system and primary psychopathy. Like Gorenstein and Newman (1980), Fowles made a convincing case for the ability of a weak behavioral inhibition system to account for psychopathic

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behavior. Furthermore, by linking the behavioral inhibition system to electrodermal responding, Fowles illustrated the potential of the septo-hippocampal model to account for the psychopaths' distinctive pattern of psychophysiological responding in addition to their behavioral characteristics.

There appears to be a growing consensus about the value of a septo-hippocampal model of disinhibited behavior. However, the utility of the model rests on its ability to stimulate research by generating new hypotheses and a broad perspective for interpreting both new and older findings. Several recent investigations supported the usefulness of the model in generating veridical predictions (Gorenstein, 1982; Newman et al., 1983; Waid & Orne, 1982). For example, Waid and Orne (1982) predicted that "undersocialized" subjects would have more difficulty than would control subjects on a verbal Stroop task that required them to inhibit a dominant response. Equally relevant was their prediction that undersocialized subjects, in comparison with control subjects, would exhibit fewer electrodermal responses on those trials requiring response inhibition. Both hypotheses were supported by the data.

Our purpose is to use this model of disinhibited behavior to investigate two major issues in the study of extraversion and psychopathy. The first involves the passive avoidance deficit of psychopathic subjects and is addressed in Experiment 1. The second concerns the relationship between psychopathy and extraversion and is addressed in Experiments 2 and 3.

Experiment 1

Passive avoidance involves withholding a response to avoid punishment. Because psychopaths frequently engage in antisocial behavior with apparent disregard for the consequences of such behavior, passive avoidance learning has been central to theory and research in psychopathy (Hare, 1970; Trasler, 1978). The classic experiment on passive avoidance was reported by Lykken in 1957. The experiment involved a mental maze with 20 choice points. At each choice point, subjects had to choose which of four response levers would advance them to the next step of the maze. Subjects were given 20 trials to learn the correct sequence of 20 lever presses that constituted successful navigation through the maze. The passive avoidance aspect of the task was described as "latent" and was not presented to subjects as part of their experimental task. It required subjects to learn which of the three incorrect responses at each choice point would result in electric shock and to avoid making that response. Although psychopaths mastered the maze as well as controls, they exhibited a passive avoidance deficit on the latent task. In contrast to control subjects, who learned to avoid lever presses followed by electric shock, psychopathic subjects were more likely to commit punished errors.

Lykken's (1957) results have been replicated successfully by others (e.g., Schachter & Latané, 1964; Schmauk, 1970), but a study by Schmauk (1970) suggested a severe limitation in the generality of Lykken's findings. Using the same task as Lykken (1957), he found that psychopaths were deficient in passive avoidance of electric shock, but performed as well as control subjects when loss of reward was used in place of shock as punishment for avoidance errors. On the basis of these results, Schmauk concluded that psychopaths are not deficient in passive avoidance when the consequence of avoidance errors is relevant to their value system. More recently, Chesno and Kilmann (1975) proposed that the psychopath's avoidance deficit is a function of the long, monotonous tasks used to investigate avoidance learning. They speculated that under such conditions, psychopaths may experience punishment as reinforcing, as opposed to aversive, because it increases their suboptimal arousal to a more comfortable level. Consistent with this interpretation, the avoidance learning of psychopaths and controls was found to interact with the level of arousal produced by intermittent, white noise superimposed on their avoidance task. As predicted, psychopaths performed more poorly than controls in avoiding electric shock when stimulation was minimal (i.e., low noise), but performed as well as controls on the same task when stimulation was increased (i.e., high noise). On the basis of these studies, one could conclude that the avoidance deficits exhibited

by psychopaths under laboratory conditions are irrelevant to antisocial behavior. If the passive avoidance deficit of psychopaths is specific to electric shock or to boring laboratory situations, then the importance of such a deficit in accounting for psychopaths' antisocial behavior outside of the laboratory is likely to be minimal.

An alternative perspective is afforded by reference to the "septal syndrome." Of particular relevance is the fact that the passive avoidance deficit exhibited by rats with septal lesions appears to be as much a function of the response to be inhibited as it is a function of the punishment contingency. For instance, McCleary (1966) observed that the likelihood of observing a deficit in response suppression among these animals depends on a particular balance between the tendency to make a response and the requirement to inhibit it. He argued that without a drive to respond, the notion of response suppression is meaningless and that without an aversive consequence for continued responding, a deficit in response suppression will not be observed. Fried (1972) attributed an even greater role to the approach response in determining the septal deficit. He proposed that rats with septal lesions overrespond to motivating stimuli such as received or expected reward and that this tendency leads to an impaired capacity to modify behavior associated with such stimuli. Along the same line, other interpretations of septal dysfunction suggest an attentional explanation whereby dominant cues (i.e., those associated with current goal-directed behavior) interfere with attention to less salient cues (Donovick, Burright, & Bengelloun, 1979; Newman et al., 1983). These reviews of septal dysfunction suggest that rats with septal lesions are prone to form a dominant response set that is resistant to interruption or alteration by cues that are not associated with their current goal-directed behavior.[1]

If the behavioral deficits of psychopaths are analogous to those of septal rats, then the tendency to form a dominant response set may be an important factor determining the expression of deficient passive avoidance in psychopaths. Once focused on a particular goal, psychopaths may attend to cues associated with this goal to the extent that it interferes with attention to other cues. According to this analysis, the passive avoidance deficit of psychopaths should be most apparent when there are salient cues for approach responding, established by previous learning or by their anticipated association with reward, that interfere with the processing of additional cues that may signal the need to inhibit or otherwise alter behavior.

We therefore investigated passive avoidance learning in psychopathic and nonpsychopathic subjects by presenting subjects with a salient approach contingency in addition to the avoidance contingency. The task involves a successive go/no-go discrimination task in which subjects are rewarded for responding to "correct cues" and are punished for responding to "incorrect cues." In order to avoid punishment (i.e., loss of reward), subjects must withhold a response that frequently results in reward. We predicted that under these circumstances, psychopathic subjects would overrespond to cues for reward and would have difficulty learning passive avoidance on the basis of the less salient cues signaling punishment.

A second go/no-go discrimination task was administered to all subjects to control for general learning and motivational factors and, in particular, to determine whether psychopathic subjects were capable of appropriate response inhibition when doing so results in additional reward. In contrast to the first task, subjects received the same reward for correctly withholding a response as they received for making correct responses. We predicted that equating the outcome of appropriate responding and appropriate response inhibition would prevent one response strategy from becoming dominant and interfering with

[1] Although we have emphasized the tendency of rats with septal lesions to overrespond to cues for reward in discussing their deficient response suppression, we note that others attribute this same behavior to insensitivity to cues for punishment (e.g., Dickinson, 1974; Gray, 1982). Whether strong approach responding or weak response to punishment is of greater importance in determining the behavioral deficits of rats with septal lesions remains an interesting question (see Gorenstein & Newman, 1980). For our purposes, it is sufficient to recognize that the passive avoidance behavior of rats with septal lesions may depend on their ongoing, goal-directed behavior as well as their response to punishment (see Gorenstein & Newman, 1980).

the other (see Donovick et al., 1979, p. 89). Therefore, we predicted that psychopaths would perform as well as controls in this condition.

Method

Subjects

The subjects for this experiment were 90 white males between the ages of 14 and 18. We selected them by choosing every fifth name from an alphabetical file of the residents at the Indiana Boys School (IBS). All subjects who consented to participate completed a personality battery and were included in the behavioral testing. Three subjects selected for the study had to be replaced: One chose not to participate, one was unable to complete the personality questionnaire, and one subject became upset during behavioral testing. To ensure that the experimenter was naive to subjects' classification during testing, subjects were assigned to groups after completion of the experiment.

Subject Assignment

Methodology for the selection of psychopathic subjects for research continues to be controversial. In their review, Hare and Cox (1978) suggested the use of Cleckley criteria. However, this method requires access to case records or extensive knowledge of the subjects. Furthermore, this method may not be appropriate for use with delinquents. Other methods include the use of behavior checklists, scales from the Minnesota Multiphasic Personality Inventory (MMPI), and the socialization scale of the California Psychological Inventory (Gough, 1960). Because none of these methods, by itself, appears entirely adequate, Hare and Cox (1978) suggested the use of multiple measures.

Subjects in our experiment were assigned to one of four groups on the basis of whether their scores were above or below the medians on Scale 4 (psychopathic deviate, or *Pd*) and the Welsh Anxiety scale (Welsh, 1956) of the MMPI. Eleven subjects qualified for the high-*Pd*, low-anxiety (primary psychopathic) group; 34 subjects had high *Pd* and high anxiety scores (secondary psychopathic); 14 subjects had low *Pd* scores and high anxiety scores (neurotic); and 31 subjects had low *Pd* and low anxiety scores (nonpsychopathic).

Use of the *Pd* scale as a measure of psychopathy may be criticized for several reasons. Because it is not a behavioral index, subjects identified by this method may not have exhibited activities associated with psychopathy or antisocial personality disorder. In addition, nonpsychopathic individuals in the general population have been found to exhibit elevated scores on this measure. Finally, the *Pd* scale may not discriminate between those whose antisocial behavior is the result of an underlying personality disorder (i.e., psychopathy) and those whose antisocial behavior is secondary to some other factors (see Hare & Cox, 1978; Spielberger, Kling, & O'Hagan, 1978).

Despite these criticisms, the *Pd* scale was considered appropriate for use in this study because (a) it is widely accepted as a measure of antisocial behavioral tendencies, (b) it has been used extensively to investigate the relationship between "learning" and psychopathy, and (c) it is considered to be especially sensitive in identifying delinquents (Spielberger et al., 1978, p. 34).

In order to reduce the heterogeneity of subjects selected by the *Pd* scale alone, this measure was used in conjunction with the Welsh Anxiety scale. Whether subjects are selected on the basis of a "psychopathy checklist" or the *Pd* scale, studies of avoidance learning have demonstrated the necessity of dividing psychopathic subjects into primary psychopaths and secondary psychopaths because secondary psychopaths typically perform like nonpsychopaths on learning tasks (e.g., Chesno & Kilmann, 1975; Hare, 1970; Schmauk, 1970).[2] Both the Welsh Anxiety scale and the Taylor Manifest Anxiety scale of the MMPI have proven adequate for this purpose (see Sutker, Archer, & Kilpatrick, 1981).

Although we did not have access to subjects' files to aid in the classification of subjects, the staff at the IBS had assessed 76 of our 90 subjects, using the system advocated by Quay and Parsons (1971). This system combines data from the Behavior Problem Checklist, the Checklist for the Analysis of Life-History Data, and the Personal Opinion Survey to arrive at ratings on the following dimensions: unsocialized–psychopathic, neurotic–disturbed, inadequate–immature, and socialized–subcultural. A one-way analysis of variance (ANOVA) was conducted on the mean T scores for each group on the unsocialized–psychopathic dimension. This analysis yielded a significant F ratio, $F(3, 72) = 2.73$, $p = .05$. The mean T scores on this dimension were 54.4, 50.2, 48.0, and 49.6 for the primary psychopathic, secondary psychopathic, nonpsychopathic, and neurotic subjects, respectively. Pairwise comparisons in which we used a t test for differences among several means yielded significant differences between the primary psychopathic and nonpsychopathic subjects, $t(72) = 2.90$, $p < .01$, and between the primary psychopathic and neurotic subjects, $t(72) = 2.14$, $p < .05$. The difference between the group means for the two psychopathic groups missed significance at the .05 level, $t(72) = 1.90$, $p < .10$.

Additional description of the experimental groups may be seen in Table 1. The characteristics of the high-*Pd*, low-anxiety subjects involving low socialization scores, high "psychopathy" ratings on the measure of Quay and Parsons (1971), and average IQ scores on the Revised Beta Examination (Lindner & Gurvitz, 1946) suggest that "psychopathic" is an appropriate description of these subjects.

Procedure

Subjects signed a consent form, completed a personality inventory, and performed the behavioral tasks. The personality testing was conducted in a quiet room at a seminar table in groups of approximately 10 participants. The person administering the tests was present at all times. He answered questions and occasionally helped a subject to read test items.

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[2] The term *psychopathy* is used to connote primary psychopathy throughout the rest of this article unless otherwise noted.

Table 1
Group Means on Pretest Measures

Type of subject	Age	IQ	*Pd*	Welsh A	Socialization
Primary psychopathic	17.0	98.6	29.1	15.7	22.9
Secondary psychopathic	16.8	92.8	29.6	26.6	23.0
Nonpsychopathic	16.9	101.6	20.2	12.5	28.6
Neurotic nonpsychopathic	16.6	89.4	22.9	25.9	25.1

Note. Pd = Psychopathic Deviate scale and Welsh A = Welsh Anxiety scale, both from the Minnesota Multiphasic Personality Inventory. The IQ score of the nonpsychopathic group was significantly higher than the scores of secondary and neurotic subjects but not higher than primary psychopathic subjects. Scores on the *Pd* and Welsh A scales reflect the selection criteria. Primary and secondary psychopathic subjects scored significantly lower than the nonpsychopathic groups on the Socializaton scale of the California Personality Inventory.

The materials for the two tasks consisted of two decks of sixty-four 3 × 5 in. file cards. Mounted on each file card was a 2-digit, 1-in. high, black vinyl numeral. In each task there were eight different 2-digit numerals (e.g., "17," "98"), and the series of eight numbers was repeated eight times in a different random order for a total of 64 displays or trials. The use of stimulus decks was counterbalanced between tasks. Standard poker chips were used as reinforcements in both tasks. Each chip was redeemable for one cigarette, or eight poker chips were redeemable for one 30-cent candy bar at the end of the experiment.

The behavioral testing was conducted in a relatively quiet office in the psychology building of the IBS. Order of task administration was randomly determined for each subject.

Task 1: Passive avoidance with loss of reward (PALR). In the PALR task, four of the eight numbers were arbitrarily designated positive stimuli (S+) and the other four numbers were designated negative stimuli (S−). The subjects' task was to learn by trial and error when to respond and when not to respond. No rewards were won or lost when a subject did not respond. A response consisted of touching the stimulus cards. The stimulus cards were placed in front of a subject, one at a time, and he was given approximately 2 s to respond before the next card was presented. A response was recorded each time that a subject tapped a card with his finger.

Task 2: Reward for response inhibition (RRI). The RRI task involved the identical discrimination task used in Task 1. The only difference between the RRI and the PALR tasks concerned the administration of reinforcements. In the RRI task, subjects could win a chip on every trial if a correct response was made; that is, subjects received a reward for tapping an S+, and they also received a reward for not tapping a card with an S−. There was no punishment for making an incorrect response (i.e., tapping an S−) or for failing to respond (i.e., not tapping an S+).

Results and Discussion

There are two types of errors that are relevant for evaluating performance on these two behavioral tasks. The first type is passive avoidance errors or the number of times that a subject failed to inhibit a response to an S−. Passive avoidance errors are errors of commission. The second type is omission errors or the failure of a subject to respond to an S+. Separate analyses are reported for each type of error. A three-factor, unweighted means ANOVA was conducted for each type of error. Two factors, group and order, were between-subjects variables with four and two levels, respectively. The third variable, task, was a within-subjects variable and had two levels (PALR, RRI). Means and standard deviations for the four groups on the two tasks are presented in Table 2. For the analysis of passive avoidance errors, there were no significant main effects or interactions with the exception of the Order × Task interaction, $F(1, 82) = 4.38$, $p < .05$. For the analysis of omission errors, there was a significant main effect for task, $F(1, 82) = 7.52$, $p < .01$, with more omission errors being made on the RRI than on the PALR task. There was also a significant interaction of Group × Task, $F(3, 82) = 2.71$, $p < .05$, with the neurotic group and to a lesser extent the primary psychopathic group making more omission errors on the RRI task than on the PALR task.

To test the hypothesis that primary psychopathic subjects would exhibit excessive passive avoidance errors relative to controls on the PALR task, we conducted planned comparisons on the mean number of passive avoidance errors committed by primary psychopathic (PP), secondary psychopathic (SP), and nonpsychopathic (NP) subjects. There were no hypotheses concerning the performance of neurotic subjects. The mean number of passive avoidance errors on the PALR task for the PP, SP, and NP groups was 14.3, 11.08, and 10.02, respectively. The difference

Table 2
Group Means and Standard Deviations on Behavioral Tasks

	PALR				RRI			
	Passive avoidance errors		Omission errors		Passive avoidance errors		Omission errors	
Type of subject	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Primary psychopathic	14.29	5.84	7.98	4.50	12.44	4.43	10.71	4.75
Secondary psychopathic	11.08	4.43	8.43	4.99	12.94	4.84	8.59	4.22
Nonpsychopathic	10.02	3.91	8.48	4.66	12.34	5.86	8.42	4.77
Neurotic nonpsychopathic	11.36	5.87	8.50	5.46	12.86	5.75	13.21	5.60

Note. PALR = passive avoidance with loss of reward; RRI = reward for response inhibition.

between the means of the PP and NP groups was significant, $t(82) = 2.74$, $p < .01$, as was the difference between PP and SP group performance, $t(82) = 2.08$, $p < .05$. The difference between the SP and NP groups was not statistically significant, $t(82) < 1.0$

The mean number of omission errors on the PALR task was 7.98, 8.43, and 8.48 for groups PP, SP, and NP, respectively. As expected, none of these means was significantly different from the others, $t(82) < 1.0$ in each case.

The RRI task was included to assess performance of subjects on the identical discrimination involving reward only. Because the reinforcement for errors of response and errors of omission was identical, no significant differences were predicted. The mean number of commission errors on the RRI task was 12.44, 12.94, and 12.34 for the PP, SP, and NP groups, respectively. (The term *passive avoidance error* is replaced by *commission error* because punishment is no longer involved.) None of these means was significantly different from the others, $t(82) < 1.0$ in each case. The mean number of omission errors on the RRI task was 10.71, 8.59, and 8.42 for groups PP, SP, and NP, respectively. None of the differences among groups was statistically significant.

As predicted, psychopathic subjects committed more passive avoidance errors than controls when avoidance required the inhibition of a rewarded response (i.e., PALR condition). This deficit appeared even though loss of reward was the penalty for avoidance errors (cf. Schmauk, 1970). Furthermore, this deficit was not apparent on a variation of this task, which entailed the same learning and response requirements; when the task was altered so as to equate the incentives for correct responding and correct inhibition, the deficit of psychopathic subjects was eliminated.

Experiment 2

For nearly 20 years Eysenck (1967) has maintained that a fundamental relation exists between psychopathy and extraversion. Despite considerable research, evidence that psychopaths are significantly more extraverted than control subjects remains equivocal (see Gray, 1981; Hare, 1982; Passingham, 1972). However, Hare and Cox (1978) noted that "though there does not seem to be a consistent empirical correlation between Eysenck E scale and ratings of psychopathy (possibly because the components of the E scale, sociability and impulsivity, are seldom analyzed separately), there are some interesting theoretical connections between the two dimensions, e.g., with respect to cortical arousal, conditioning, and avoidance learning, etc." (p. 16).

Gorenstein and Newman (1980) proposed that the syndromes of disinhibition including psychopathy and extraversion share a psychological diathesis but differ in the social manifestation of this diathesis. Accordingly, the relationship between psychopathy and extraversion may not be a direct one, but an indirect one, mediated by a psychological diathesis resembling behavioral inhibition system dysfunction. If psychopathy and ex-

traversion are diverse expressions of a common diathesis, it is not necessary that the social expressions must overlap. A variety of developmental and environmental factors are likely to influence the eventual expression of any psychological predisposition, and these factors could radically alter the eventual expression of a particular diathesis (see Lykken, 1982). For example, the relative failure of cues for punishment to inhibit ongoing behavior could contribute to extraverts' freedom from social anxieties and enjoyment of social encounters. The same predisposition could contribute to psychopaths' tendency to act without considering the consequences of their actions. In one case, a weak behavioral inhibition system may underlie improved interpersonal relations (e.g., gregariousness), whereas in the latter it contributes to interpersonal conflict and antisocial behavior.

Rather than suggesting an investigation of the relationship between psychopathy and extraversion by comparing the extraversion scores of psychopaths and controls, this perspective suggests that one should explore the relationship between psychopaths and extraverts at a more fundamental level related to learning/emotional style. In Experiments 2 and 3 we adopted this strategy for examining the relationship between psychopathy and extraversion. In other words, having demonstrated a deficit in psychopathic delinquents on the passive avoidance task, we next compared introverted and extraverted university students on the same task.

Method

Subjects

The subjects were 40 male university students who consented to complete personality and behavioral testing in return for experimental credit in a psychology course. Subjects were divided into two groups on the basis of extraversion scores (i.e., at the median) from the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975). The mean scores were 17.8 for extraverts and 11.7 for introverts.

Procedure

Task 1: Passive avoidance with loss of reward (PALR). The PALR task was the same task used in Experiment 1 with the following modifications. Instead of using eight series of the eight 2-digit numbers, we presented ten series of the eight 2-digit numbers. Therefore, a total of 80 (as opposed to 64) trials were administered. In addition, the poker chips used as reinforcements were each redeemable for 5 cents rather than for cigarettes as in Experiment 1. Correct responses were rewarded with 5 cents and incorrect responses resulted in the loss of 5 cents.

Task 2: Passive avoidance with no reward (PANR). This task was identical to the PALR task with one exception pertaining to reinforcements. Rather than being rewarded for correct responses and punished for incorrect responses, one could lose reward in two ways: Subjects lost 5 cents for tapping an S− (i.e., passive avoidance error) and they lost 5 cents for not tapping an S+ (i.e., omission error). Each subject was given 60 chips at the start of the task. The order of task presentation was counterbalanced.

Because the symmetry of the reinforcements and not the valence (i.e., reward vs. punishment) was considered to be important, the PANR task entailed "punishment only" instead of the "reward only" used in the control (RRI) task of Experiment 1. Like the RRI control condition used in Experiment 1, the PANR task involves the same discrimination as the PALR task, but unlike the RRI task, it must be learned on the basis of tangible punishment.

Results and Discussion

As in Experiment 1, separate analyses were conducted for passive avoidance errors and omission errors. A two-factor ANOVA was conducted for each type of error; groups was the between-subjects factor and task was the within-subjects factor. For passive avoidance errors, neither the main effect for groups, $F(1, 38) = 2.16$, nor the effect of task, $F(1, 38) < 1.0$, was significant. The Groups × Task interaction approached statistical significance, $F(1, 38) = 3.56$, $p = .06$. For the analysis of omission errors, none of the main effects for groups, task, and the Groups × Task interaction was significant $F(1, 38) < 1.0$, in all cases.

To test the hypothesis that extraverts would commit more passive avoidance errors on the PALR task, we conducted planned comparisons. The mean number of passive avoidance errors on the PALR task was 12.32 for extraverts and 8.52 for introverts. This difference was significant, $t(38) = 2.54$, $p < .02$. The mean number of omission errors on the PALR task was 5.68 for extraverts and 7.67 for introverts. This difference was not significant, $t(38) < 1.0$.

On the PANR task, when the asymmetry of reinforcement outcomes was eliminated, so were the differences in group performance. The mean number of passive avoidance errors

was 10.26 for extraverts and 10.48 for introverts. The mean number of omission errors was 7.16 for extraverts and 7.48 for introverts. These differences were not statistically significant, $t(38) < 1.0$. Thus when the experimental task involved only punishment, extraverts performed at least as well as introverts (see Figure 1).

The results support the hypotheses. Like psychopathic subjects, extraverts were deficient, relative to controls, in avoiding loss of money when avoidance required the inhibition of a rewarded response.

Although traditional theories of psychopathy (Hare, 1970) and extraversion (Gray, 1972) emphasize failure to learn from punishment, no evidence for this deficit was observed among extraverts when there was no competing tendency to respond for reward. On the control task when the asymmetry of outcome was eliminated and the task had to be learned on the basis of punishment alone, there was no difference between the performances of introverts and extraverts.

Experiment 3

In Experiments 1 and 2 we demonstrated a passive avoidance deficit among psychopathic delinquents and among extraverted college students. In Experiment 3 we investigated passive avoidance learning on the PALR task, using subjects recruited by a newspaper advertisement. Widom (1977) argued that the study of incarcerated psychopaths provides a biased sample of the psychopathic population. Not only is institutionalization a confounding variable in prisoners, but the fact that such subjects are currently imprisoned suggests that they may represent a sample of "unsuccessful" psychopaths. Widom demonstrated the feasibility of recruiting noninstitutionalized psychopaths for research through the use of a newspaper advertisement. In her original study, individuals responding to the advertisement were asked to send a short autobiographical statement and were prescreened on that basis. We used the same advertisement, but tested all persons who responded to the ad. This sample provided an opportunity to study passive avoidance as a function of diagnosis of psychopathy, as well as extraversion in an unincarcerated population.

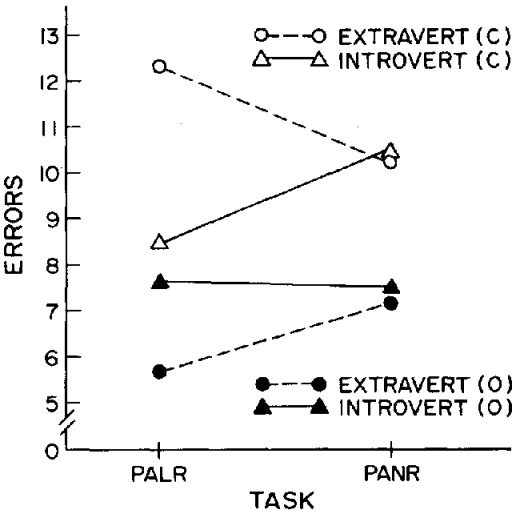

Figure 1. Mean commission (C) and omission (O) errors committed by extraverts and introverts on the PALR and PANR tasks.

Method

Subjects

Subjects were 40 men and women between the ages of 18 and 50 (mean age = 25.2) who responded to the following advertisement:

> ARE YOU ADVENTUROUS? Psychologist studying carefree people who've led exciting, impulsive lives. If you're the type of person who would do anything for a dare, call [xxx–xxxx].

The method of recruitment and the characteristics of these subjects are more fully described by Widom and Newman (1985).

Procedure

Subjects completed a personality battery and a structured interview as well as behavioral testing. The entire procedure lasted 2 to 3 hours and subjects received $10 for participating. After completing the personality testing, all subjects received the behavioral task and then the structured interview. The passive avoidance task used in Experiment 3 was identical to the PALR task used in Experiment 2.

Results and Discussion

Analysis: The Extraversion Dimension

Subjects were divided into two groups on the basis of extraversion scores on the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975). Using a median split (median extraversion score was 17.5), we

identified 22 extraverts and 18 introverts. The mean extraversion scores were 19.3 and 13.6 for extraverts and introverts, respectively.

An ANOVA of the total number of passive avoidance errors committed by the two groups revealed a significant difference between groups, $F(1, 38) = 6.64$, $p < .02$. The mean number of passive avoidance errors was 15.05 for extraverts and 10.72 for introverts.

An ANOVA of omission errors for the two groups revealed no significant differences, $F(1, 38) < 1.0$. The mean number of omission errors was 6.77 for extraverts and 7.89 for introverts.

Analysis: The Psychopathy Dimension

To provide additional information on the relationships among extraversion, psychopathy, and passive avoidance, we reanalyzed the data, dividing subjects into groups on the basis of psychopathy. Each subject was labeled psychopathic or nonpsychopathic on the basis of personal interviews and Spitzer, Endicott, and Robins's (1975) Research Diagnostic Criteria (RDC) for Antisocial Personality (psychopathy). The small number of subjects with complete diagnostic information ($n = 37$) and the small number of individuals meeting the RDC criteria for psychopathy ($n = 5$) precluded a division of subjects into primary and neurotic psychopathic groups. Rather, an analysis of covariance was conducted with psychopathy as the independent variable, passive avoidance errors as the dependent variable, and Welsh Anxiety scores as the covariate. The main effect for psychopathy approached significance, $F(1, 35) = 3.52$, $p < .07$. The contribution of the covariate was not significant ($p = .29$). The unadjusted means were 16.4 and 12.6 passive avoidance errors for psychopaths and nonpsychopaths, respectively. The adjusted means were 17.7 and 12.4 passive avoidance errors for psychopathic and nonpsychopathic groups, respectively. The comparable analysis for omission errors yielded no significant differences, $F(1, 35) < 1.0$.

The results of Experiment 3 provide further information regarding passive avoidance learning in extraverts. As in Experiment 2, extraverts made significantly more passive avoidance errors than introverts on the PALR task. Although the subjects in Experiments 2 and 3 differed with respect to age and education, the relation between extraversion and passive avoidance was similar for the two samples (see Figure 2).

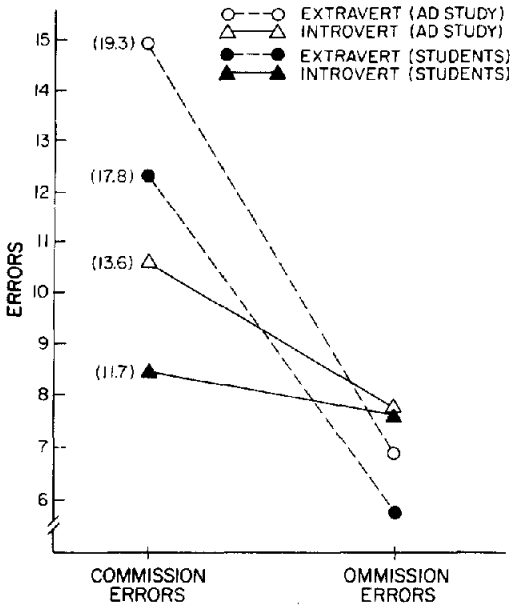

Figure 2. Mean commission (C) and omission (O) errors committed on the PALR task by introverted and extraverted college students and by introverts and extraverts recruited by newspaper advertisement. (Mean extraversion scores for each group are provided in parentheses.)

Finally, we reanalyzed the data from Experiment 3 to assess the relationship between passive avoidance errors and psychopathy. Despite sizable differences in performance on the passive avoidance measure, the small number of subjects meeting all RDC criteria for antisocial personality appeared to prevent the effect from reaching statistical significance.

General Discussion

Recent theoretical (Fowles, 1980; Gorenstein & Newman, 1980) and experimental reports (Gorenstein, 1982; Newman et al., 1983; Waid & Orne, 1982) suggested that the "septal syndrome" provides a useful model of disinhibited behavior. Our results provide further support for the usefulness of the model. As predicted, both psychopathic and extraverted subjects demonstrated a passive avoidance deficit when avoidance required

subjects to inhibit a response that frequently led to reward. Whereas Schmauk (1970) has proposed that psychopaths are as adept as control subjects in avoiding tangible (i.e., monetary) punishment, our results demonstrate that psychopathic subjects may exhibit a passive avoidance deficit even when loss of reward is the consequence of avoidance errors. Similarly, Chesno and Kilmann (1975) argued that the psychopath's avoidance deficit is "an artifact of the long, monotonous, and unstimulating nature of the avoidance tasks employed" (p. 149). However, a passive avoidance deficit appeared in these experiments despite the use of a brief, rapid-paced task that involved immediate and tangible incentives for performance. The results of the control tasks used in Experiments 1 and 2 provided further evidence that these results are not attributable to lack of motivation or to general lack of ability. When the basic go/no-go discrimination task was altered slightly to eliminate the asymmetry in reinforcement outcomes, the performance deficit of psychopathic and extraverted subjects was eliminated as well.

The performance deficits observed in this research appear to be related to the interaction of reward and punishment. Although their passive avoidance behavior may reflect inadequate motivation under some circumstances, the results of these experiments suggest that, relative to controls, psychopathic delinquents and extraverts are deficient in learning to inhibit goal-directed behavior in the presence of cues for reward. Thus, like the work of Schmauk (1970) and of Chesno and Kilmann (1975), our work suggests that the expression of passive avoidance deficits among disinhibited individuals may be limited by certain situational factors. However, specifying salient cues for approach responding as a condition for observing this deficit does not limit the relevance of passive avoidance deficits in accounting for syndromes of disinhibition.

The disruptive effect of immediate incentives on the behavior of disinhibited individuals has been noted frequently by those who have delineated these syndromes (e.g., Cleckley, 1964; Hare, 1970; Shapiro, 1965). Grant (1977), for instance, in his chapter "What Makes a Psychopath," concluded that for psychopaths "the appeal of the moment is strong enough to *block out* all thought of consequences" (p. 48; emphasis added). In laboratory studies as well, approach responding has been salient in recent demonstrations of response suppression deficits among disinhibited individuals. They were deficient relative to control subjects on tasks that required subjects (a) to withhold a playing response that could lead to reward (Siegel, 1978), (b) to alter a response set that was no longer appropriate (Gorenstein, 1982), and (c) to inhibit a dominant verbal response on the modified verbal Stroop task used by Waid and Orne (1982).

A second purpose of this investigation was to explore an alternative strategy for evaluating the relationship between psychopathy and extraversion. Although it is common to consider psychopathic behavior as an extreme form of extraversion, we interpreted the relationship between psychopathy and extraversion as an indirect one mediated by their mutual relationship to the hypothetical construct of a weak behavioral inhibition system. According to this perspective, extraverts and psychopaths share a psychological diathesis that may be essential to understand their respective behavioral styles. The results of this study provide further support for the relationship between psychopathy and extraversion at the behavioral level of analysis. Extraverts, like psychopaths, were found to exhibit a passive avoidance deficit, a deficit often considered fundamental in the etiology of psychopathy (e.g., Hare, 1970; Trasler, 1978). Although support for the association between extraversion and psychopathy is provided by these studies, caution must be exercised in the interpretation of the results. The subjects designated "psychopathic" in Experiment 1 were juvenile delinquents selected on the basis of MMPI scores and may differ from adult subjects selected on the basis of Cleckley criteria (see Hare & Cox, 1978). It is also conceivable that extraverts and psychopaths performed similarly on the passive avoidance task for different reasons and that performance of extraverts on this measure does not reflect the same processes that are considered etiologically significant for psychopathy.

Following Widom (1977), Sutker et al. (1981) suggested that it should be possible to

identify "successful psychopaths" who share significant cognitive and psychological characteristics but who do not necessarily engage in blatant antisocial behavior. According to those authors, description of these adaptable psychopaths may clarify the factors that allow them to maintain their behavior within sociolegal bounds (p. 667). Although extraverts are definitely not all psychopaths, these two groups appear to share significant psychological characteristics. If research continues to support this observation, the relationship between psychopathy and extraversion may represent an important source for the investigation of factors mediating the adaptive and maladaptive expressions of such characteristics.

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Manuscripts Accepted for Publication in the Section Personality Processes and Individual Differences

The Induction of Depressive Affect After Prolonged Exposure to a Mildly Depressed Individual. Mary J. Howes, Jack E. Hokanson (Department of Psychology, Florida State University, Tallahassee, Florida 32306), and David A. Lowenstein.

The Attributional Norm of Internality and Depressive Sensitivity to Social Information. Gifford Weary (Department of Psychology, Ohio State University, 164 West 19 Avenue, Columbus, Ohio 43210), John S. Jordan, and Martha G. Hill.

Cross-Cultural Personality Correlates of Intensity and Content-Category of Positive Experiences. Zipora Magen (School of Education, Tel Aviv University, Ramat Aviv, Israel).

Learned Helplessness and Judgments of Control. Carol E. Ford (Department of Psychology, University of Kansas, Lawrence, Kansas 66045) and John Neale.

Age, Education, and the Internal Consistency of Personality Scales. Sam G. McFarland (Department of Psychology, Western Kentucky University, Bowling Green, Kentucky 42101) and Craig M. Sparks.

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A Developmental Study of the Cognitive Basis of Performance Impairment After Failure. Arden Miller (Department of Leadership and Foundations, UPO Box 1340, Morehead State University, Morehead, Kentucky 40351).

The Relationships Between Identity in Young Adulthood and Intimacy at Midlife. Stephen Kahn (Department of Behavioral Sciences, University of Chicago, 5848 South University Avenue, Chicago, Illinois 60637), Gary Zimmerman, Mihaly Csikszentimihalyi, and Jacob W. Getzels.