JOURNAL OF RESEARCH IN PERSONALITY 21, 464–480 (1987)

Reaction to Punishment in Extraverts and Psychopaths: Implications for the Impulsive Behavior of Disinhibited Individuals

JOSEPH P. NEWMAN

University of Wisconsin–Madison

To explore the factors mediating impulsivity in the syndromes of disinhibition, we investigated the ability of extraverts and psychopaths to use signals for punishment to withhold maladaptive approach behavior under various incentive conditions. The results provide evidence that (a) in comparison to controls, extraverts and psychopaths fail to use cues for punishment to inhibit incorrect approach responses; (b) the deficient response inhibition of disinhibited subjects is specific to approach-avoidance situations; (c) under conditions involving monetary rewards and punishments, disinhibited subjects are less likely to slow down, and may even respond more quickly, following punishment; and (d) the tendency to speed up rather than slow down following punishment is associated with failure to learn from punishment. The results suggest that once focused on obtaining reward, extraverts and psychopaths display an active (disinhibited) as opposed to a passive (reflective) reaction to punishment and frustrative nonreward. This reaction to punishment appears to interfere with learning cues for punishment and may underlie the poor passive avoidance learning and impulsive behavior that characterize the syndromes of disinhibition.

Unlike anxiety, impulsivity has received relatively little attention from investigators of personality and psychopathology. Although it has been customary to conceptualize a variety of psychopathological syndromes as maladaptive manifestations of anxiety, such speculation has been less common in the sphere of impulsivity (cf. H. J. Eysenck & Rachman, 1971). While recognizing the value of diagnostic systems that seek to specify discrete categories of psychopathology (e.g., DSM-III), it would

The research reported in this article was supported by National Institute of Mental Health Grants MH 37711 and MH 392211. I wish to acknowledge theoretical contributions to this work by JoAnn Bachorowski, Eric Howland, Dave Kosson, Sharon Nichols, C. Mark Patterson, and Debra Pearce-McCall. Requests for reprints should be sent to Joseph Newman, Department of Psychology, University of Wisconsin, 1202 West Johnson Street, Madison, WI 53706.

0092-6566/87 $3.00

be unfortunate to disregard the overarching concepts of anxiety and impulsivity which provide a more integrative perspective on a wide range of behavior problems.

A notable exception to the relatively atheoretical approach manifested in DSM III is the dimensional view of personality and psychopathology developed by H. J. Eysenck (1967, 1981). Identifying the factors of extraversion and neuroticism using factor analytic techniques, Eysenck has attempted to ground these factors in physiology, postulate corresponding psychological components, and develop the implications of these theoretical constructs for diverse forms of normal and psychopathological behavior.

While embracing much of Eysenck's theoretical framework, Gray (1972, 1981) has advocated the use of anxiety and impulsivity dimensions in place of the extraversion and neuroticism dimensions preferred by Eysenck and has emphasized the septohippocampal system rather than the ascending reticular activating system in his conceptualization of the physiology underlying the introversion-extraversion dimension. Moreover, Gray has proposed that sensitivity to signals for punishment and fear conditionability replace arousal and conditionability as the psychological substrate of this dimension. Finally, associated with Gray's greater emphasis on fear conditioning and his incorporation of the behavioral effects of antianxiety drugs into the theoretical framework, there has been a corresponding tendency to place more emphasis on the introversion and anxiety components as opposed to the extraversion and impulsivity components of the model. Though it is possible to deduce many of the important implications for impulsivity by virtue of the model's symmetry, this process becomes increasingly difficult as Gray's neuropsychological theory of anxiety continues to grow in complexity (e.g., Gray, 1982).

The focus of research in my laboratory involves the use of the extensive literature on the behavioral consequences of septal lesions to generate specific hypotheses concerning a number of behavioral syndromes characterized by impulsive, disinhibited behavior. These so-called "syndromes of disinhibition" include psychopathological disorders such as psychopathy, hyperactivity, hysteria, and early-onset alcoholism as well as nonpathological forms of impulsivity, most notably, extraversion.[1] According to the model, the various syndromes of disinhibition share a psychological diathesis or predisposition that may be elucidated by reference to an animal model involving dysfunction of the septal nuclei.

[1] Though the terms *psychopathy*, *hyperactivity*, and *hysteria* are used to reflect the research literature that led us to link these syndromes, these syndromes would be labeled *antisocial personality disorder*, *attention deficit disorder*, *somatization disorder*, and *histrionic personality disorder* using DSM-III.

As might be expected from models derived, for the most part, from the same physiological substrate, there are extensive parallels between our theoretical perspective and Gray's. Nevertheless, there are also important differences stemming, in part, from Gray's incorporation of findings on antianxiety drugs into his model and his corresponding emphasis on anxiety versus impulsivity. The most important difference between the models concerns our focus on disinhibition and reflectivity following punishment rather than sensitivity to signals for reward and punishment as the psychological process underlying the introversion/extraversion dimension. Though a detailed comparison of the models is beyond the scope of this presentation (but see Patterson & Newman, 1987), suffice it to say that our research on the syndromes of disinhibition complements Gray's work on anxiety and that the Eysenck/Gray edifice may be used as an integrative framework in which to interpret our research findings.

Since proposing the "septal model" (Gorenstein & Newman, 1980), research in my laboratory has been concerned with identifying a plausible psychological predisposition for the syndromes of disinhibition. Once a potential predisposition has been identified, we plan to compare and contrast individuals who share this predisposition with the aim of discovering additional personality and developmental factors that determine the various manifestions of the underlying diathesis. Although our program of research has as its goal elucidation of the psychological processes underlying disinhibition rather than impulsivity per se, impulsive behavior figures prominently in all syndromes of disinhibition. For the purposes of this presentation, I focus on the implications of our findings for this component of disinhibited behavior.

The term *impulsivity* is used frequently in descriptions of specific behaviors, response styles, personality, and psychopathology. Although the behavioral expressions of impulsivity are exceedingly diverse, they almost always entail rapid action and the absence of adequate forethought. Impulsivity is also associated with poor judgment, because impulsive responding does not take into account the range of potential consequences for a given action or more efficient means of achieving the same goal. Implicit in this characterization of impulsive behavior is the notion that if the person had paused to reflect, he or she could have made use of information signaling the need to proceed more cautiously or to generate an alternative response to the situation. This characterization of impulsivity is similar to that of Shapiro (1965), who described the impulsive style as a breakdown in the associative processes that serve to regulate goal-directed behavior. Whereas an urge to respond is normally the beginning of a complex cognitive process involving the accrual of previous associations to the contemplated action, this process appears to be "short-circuited" in impulsive individuals.

STIMULUS	RESPONSE	PALR	RRI	PANR
S+	YES	WIN	WIN	---
	NO	---	---	LOSE
S-	YES	LOSE	---	LOSE
	NO	---	WIN	---

FIG. 1. Reinforcement contingencies in effect for the PALR (reward-punishment), RRI (reward only), and PANR (punishment only) conditions. S+ corresponds to good numbers and S− corresponds to bad numbers.

PASSIVE AVOIDANCE LEARNING IN SYNDROMES OF DISINHIBITION

The preceding development suggests that a failure to make use of situational cues and related associations to modulate instinctive responding is an important aspect of impulsive behavior. In the absence of such associations, an individual's responses would be quick, they would lack the persistence of more well-considered decisions to respond, and they would lack the benefit of prior experience. This characterization of impulsive behavior provided the impetus for investigating the ability of disinhibited subjects to use discriminative stimuli to modulate responding in a go/no-go discrimination task. In particular, we designed a task to assess the ability of impulsive subjects to use discriminative stimuli (or cues for punishment) to withhold inappropriate approach behavior. The act of withholding a response that would have resulted in punishment is referred to as *passive avoidance*.

Because impulsive subjects may become bored more easily and be less motivated than controls to perform for simple praise or to avoid noxious stimuli, we developed a short, rapid paced, learning task that involved monetary incentives (see also Chesno & Kilmann, 1975). In this task, subjects are exposed repeatedly to a series of two-digit numbers that appear one at a time, and they must learn, by trial and error, which of the stimuli are "good numbers" and which are "bad numbers" (see Fig. 1). Subjects win tokens worth a small amount of money for pressing a button during the display of a good number and they lose money for pressing when bad numbers are displayed. There are two types of errors

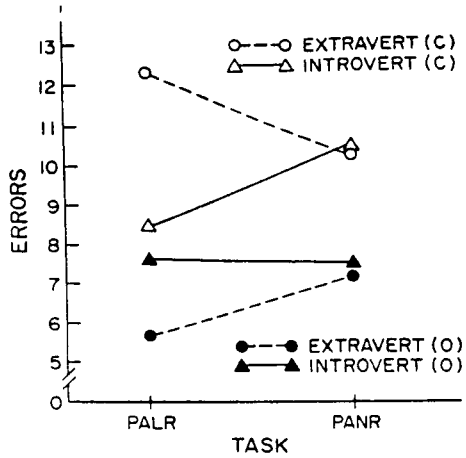

FIG. 2. Number of commission (C) and omission (O) errors made by introverted and extraverted university students (from Newman et al., 1985).

that subjects can make in this task: (1) responding to bad numbers (these are errors of commission) and (2) failing to respond to good numbers (these are errors of omission). Errors of commission are also passive avoidance errors, because they represent a failure to inhibit responses that result in punishment. If impulsive subjects are deficient in learning to use environment cues to regulate approach behavior, then they should commit more passive avoidance errors than controls.

The results from several studies provide evidence that disinhibited subjects do, in fact, make significantly more commission errors than their nondisinhibited counterparts (Newman & Kosson, 1986; Newman, Widom, & Nathan, 1985). The left side of Figs. 2, 3, and 4 provides examples of this finding. Figure 2 illustrates that extraverted college students made significantly more commission errors but not more omission errors than introverts in the condition involving reward and punishment incentives (Condition PALR). Figure 3 illustrates the same pattern of results for incarcerated psychopaths and controls using a computerized version of the same task. Figure 4 illustrates the same pattern for subjects tested at a maximum security prison for juvenile offenders. Among juvenile delinquents, the primary (low-anxious) psychopaths made significantly more commission errors than the secondary (high-anxious) psychopaths and nonpsychopathic controls. None of the group differences for omission errors was statistically significant.[2]

[2] Introverts and extraverts were assigned to groups using the extraversion scale of the Eysenck Personality Questionnaire (S. B. G. Eysenck & H. J. Eysenck, 1975). Psychopaths

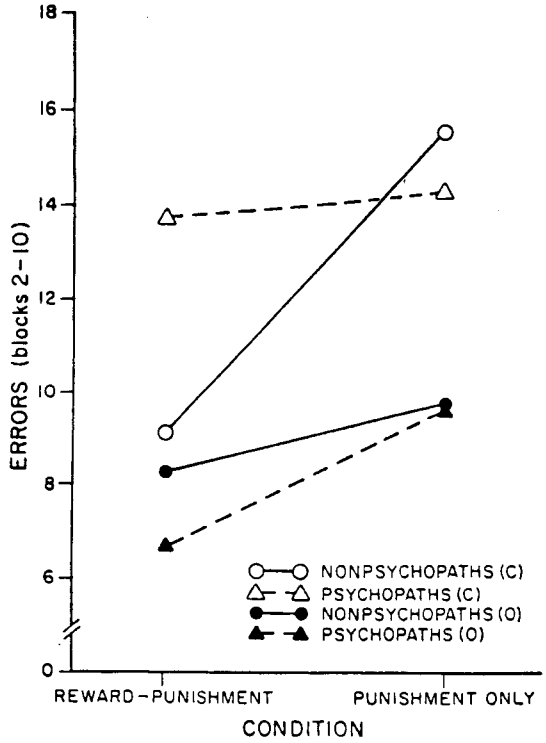

FIG. 3. Number of commission (C) and omission (O) errors made by psychopathic and nonpsychopathic prisoners (from Newman & Kosson, 1986).

THE IMPORTANCE OF INCENTIVES

The results of these studies provide fairly consistent evidence that, in comparison to controls, disinhibited subjects are less likely to inhibit punished responses while they are responding for reward. According to the septal model, the impulsive responding of disinhibited subjects reflects a response modulation deficit or relative inability to alter a dominant response set. With respect to the current paradigm, it appears that once subjects have focused on obtaining reward, they are less likely to interrupt their response set and consider the cues for punishment that signal the need for behavioral inhibition. Nevertheless, deficient response modulation represents only one of several potential accounts for our findings. Other investigators have proposed that disinhibited subjects are less motivated

and nonpsychopaths were selected using Hare's (1980) psychopathy checklist. Delinquent subgroups were formed using the psychopathic deviate and Welsh anxiety scales of the MMPI (see Newman et al., 1985).

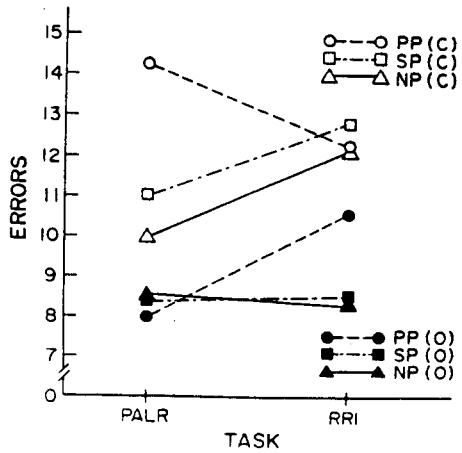

FIG. 4. Number of commission (C) and omission (O) errors made by primary psychopathic (PP), secondary psychopathic (SP), and nonpsychopathic (NP) juvenile delinquents (from Newman et al., 1985).

to perform laboratory tasks (e.g., Chesno & Kilman, 1975), that disinhibited subjects experience difficulty learning on the basis of punishment feedback (Hare, 1978), and that disinhibited subjects may be relatively unable to inhibit inappropriate responses (Brebner & Cooper, 1974, 1978).

To explore these alternatives, we investigated the performance of disinhibited and control subjects on the same go/no-go discrimination task using punishment only or reward only feedback. No group differences were expected in these conditions, because a subject's response set (to earn rewards in the reward only condition and to avoid losing money in the punishment only condition) was expected to incorporate the two ways of earning rewards or avoiding punishments from the outside of the task and, therefore, eliminate the need for subjects to alter their attentional set during the task. By contrast, we expect that subjects in the reward-punishment condition begin with a set to respond for reward and must learn to alter this response set during the task in order to learn when not to respond.

In spite of the fact that the reward only and punishment only control conditions involve the identical requirements for learning and response inhibition, we have never observed a performance deficit among disinhibited subjects in these conditions. Inspection of the right side of Figs. 2–4 provides representative illustrations of this finding. When we eliminate the asymmetry of the reinforcement contingencies, either by using reward only or punishment only, we also eliminate the performance superiority of control subjects on the go/no-go discrimination task. These data appear inconsistent with accounts that attribute the inhibitory failures of dis-

inhibited subjects to lack of motivation, insensitivity to punishment, or a general tendency to overrespond. In addition, the results suggest that group differences in response modulation are most apparent in situations involving competing approach-avoidance contingencies.

REACTION TO PUNISHMENT IN DISINHIBITED INDIVIDUALS

The results of these studies on passive avoidance learning highlight the importance of the immediate motivational context for observing response modulation deficits in disinhibited subjects. Thus, Nichols and Newman (1986) developed a paradigm to explore the relation of the motivational context to speed of responding on a "pattern matching task." In particular, we were interested in observing the extent to which availability of reward altered subjects' reactions to negative feedback. We predicted that punishment would serve to slow down or "interrupt" the behavior of introverts but fail to interrupt the response set of extraverts who were responding for reward. Moreover, Gray (1971) has proposed that in the event that punishment or frustrative nonreward fails to alter the focus of a subject's ongoing behavior, it will tend to increase the intensity of the subject's subsequent behavior. Thus, we also wished to observe whether extraverts would respond more quickly after punishment than after reward.

In this task, subjects briefly viewed a complex figure or pattern on a computer monitor followed by a second, similar pattern. Subjects' task was to press one button if the patterns were the same and a second button if the patterns were different. Feedback was noncontingent and provided according to a preprogrammed schedule to ensure that all subjects received equal amounts of positive and negative feedback. We assessed subjects' reaction to negative feedback by comparing their response times following punishment to their response times following reward.

As predicted, the motivational context had an important effect on subjects' reaction to punishment. Specifically, there was a significant group × type of feedback interaction in the reward-punishment condition that was not apparent in the reward only or punishment only conditions. As shown in Fig. 5, introverts and extraverts displayed divergent reactions to negative feedback in this condition. In contrast to introverts, who responded *more slowly* following punishment than following reward, extraverts actually responded *more quickly* after punishment feedback. Although there were no significant group differences in the reward only and punishment only conditions, there was a trend pertaining to overall response speed, with extraverts responding more quickly in the reward condition and introverts responding more quickly in the punishment condition. In a second experiment designed to explore this apparent group × condition interaction explicitly (see Fig. 6), the interaction achieved

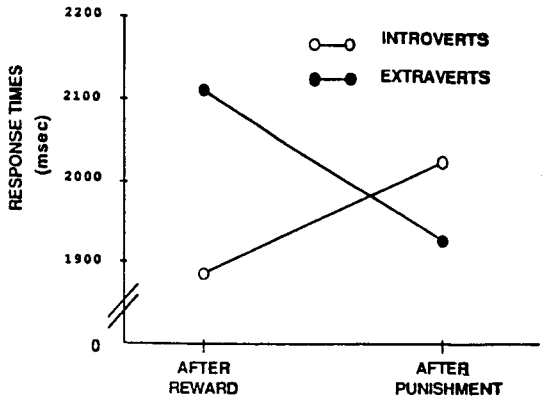

FIG. 5. Response times following reward and punishment for introverts and extraverts (from Nichols & Newman, 1986).

statistical significance, with extraverts responding more quickly in the reward condition and introverts responding more quickly in the punishment condition. Together, the results of the two experiments suggest that availability of reward serves to activate responding in extraverts and that, once activated, punishment fails to interrupt their goal-directed behavior.[3]

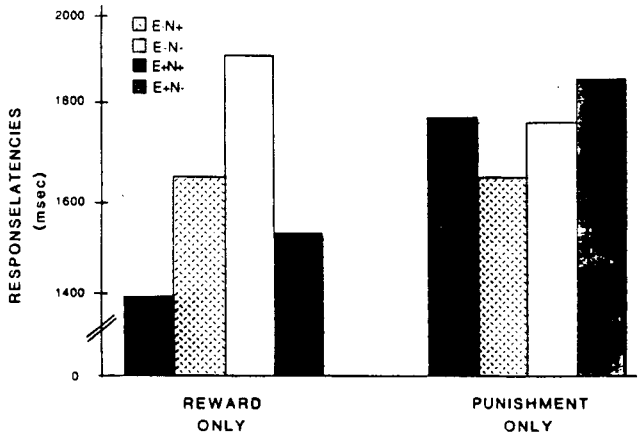

FIG. 6. Speed of responding under reward only and punishment only incentives as a function of introversion-extraversion and neuroticism (from Nichols & Newman, 1986, Experiment 2).

[3] In order to compare our results to Gray's speculation regarding impulsivity and anxiety,

An experiment by Howland and Newman (1985, 1987) examined introverts' and extraverts' reaction to reward and punishment using psychophysiological rather than behavioral measures. Using a modified version of the passive avoidance task described above, we compared subjects' heart rate (HR) and skin conductance responses (SCRs) during an 8-s interval following punishment with a comparable period following reward. In comparison to introverts, extraverts displayed greater HR acceleration as well as larger SCRs after punishment than after reward. In conjunction with the behavioral data, these results suggest that, like introverts, extraverts experience an emotional or motivational reaction to punishment,[4] but unlike the introverts' reaction to punishment, the reaction of extraverts is less likely to involve response inhibition.

A study with incarcerated psychopaths and controls provides additional evidence that an emotional reaction to feedback is instrumental in disrupting the ability of disinhibited subjects to modulate responding in accord with environmental contingencies. The study employed a modified version of the Wisconsin Card Sorting Task (WCST), which requires subjects to sort cards into piles according to three different rules involving the color, shape, and the number of stimuli on a card. At any time, only one rule is in force and the correct rule changes several times during the task in accord with subjects' performance. Each time that the rule changes, subjects must use the negative feedback that they receive to alter their response set.

In Experiment 2, an experimenter delivered monetary rewards and punishments after every response in addition to the computer-delivered feedback (i.e., the words *correct* or *wrong*). In Experiment 1, subjects performed the identical task, but monetary reinforcements were not delivered on a trial by trial basis. Instead, subjects were informed of their total earnings at the end of the task. Even though the identical task was used in Experiments 1 and 2, the results were markedly different. In Experiment 2 when rewards and punishments were delivered during the

---

we conducted additional analyses that incorporated the Eysencks' neuroticism scale. The neurotic extraverts responded most quickly in the reward only condition and displayed the greatest acceleration in response speed following punishment in the reward-punishment condition. Neurotic introverts displayed the fastest overall speed of responding in the punishment only condition and paused the longest following punishment in the reward-punishment condition. The results for neurotic extraverts are particularly consistent with Gray's formulations: they are most activated by reward and when punishment fails to interrupt an approach response set, they display the greatest behavioral facilitation.

[4] We have chosen the word *emotional* to describe disinhibited subjects' reaction to punishment, though recognizing that this reaction lacks the specificity of affect that, for many, defines emotions. By emotional reaction, we wish to connote that the affective component of the feedback has been registered physiologically and, therefore, may contribute in an important way to subsequent behavioral and emotional reactions.

task, psychopaths performed significantly more poorly than controls on nearly every performance measure. In the absence of immediate monetary feedback (i.e., Experiment 1), psychopaths performed nonsignificantly better than controls (see also, Hare, 1984; Sutker & Allain, 1987). The results of these experiments suggest that monetary incentives provided during the task disrupted the performance of psychopathic subjects.

To investigate more directly the role that psychopaths' emotional reaction to punishment may have played in disrupting their performance, we measured response speed immediately after the negative feedback that accompanied each change in the sorting rule. In contrast to controls, who displayed slower response times in reaction to the negative feedback (710 ms slower), psychopaths failed to interrupt responding and actually displayed a small increase in speed of responding following the rule changes (91 ms faster). Moreover, this significant group difference in reaction to the negative feedback that accompanied the changing contingencies ($F(1, 40) = 6.44$, $p < .02$) was virtually absent in the condition omitting immediate rewards and punishments, $F(1, 26) < 1.0$. Finally, we computed the correlation between the length of time that subjects paused after rule changes and overall performance. As expected, failure to pause following rule changes was associated with poorer task performance (e.g., for categories achieved, $r(43) = -.43$, $p < .01$).

THE RELATION BETWEEN SUBJECTS' REACTION TO NEGATIVE FEEDBACK AND LEARNING FROM PUNISHED ERRORS

The results of the preceding experiments suggest that disinhibited subjects experience an emotional reaction to negative feedback that involves response facilitation as opposed to response inhibition, particularly when they are set to respond for immediate rewards. If pausing after negative feedback is associated with information processing, then the length of the pause should be related to the strength of the association between the stimulus context (including the subjects' response) and the negative feedback. Consequently, subjects who pause after making a punished error should also be more likely to recognize the stimulus context the next time that it appears and to avoid making the same inappropriate response. By the same token, if disinhibited subjects are less likely to pause following punishment because their reaction to punishment involves response facilitation, then this reaction may be interfering with their ability to learn from punished errors.

To explore this possibility, Patterson, Kosson, and Newman (1987) tested introverts and extraverts using a modified version of the go/no-go discrimination (passive avoidance) task described earlier. Specifically, the task was modified to assess response speed following the administration of rewards and punishments. We predicted that, in comparison to introverts,

extraverts would (1) make significantly more commission errors, (2) pause less after punishment than after reward, and (3) that for all subjects, response speed following punishment would predict passive avoidance learning.

The results of Experiment 1 provided support for all three hypotheses. Although the first two hypothesis were essentially replications of earlier findings, it is worth noting that the group differences in reaction to reward and punishment feedback were still apparent on a task employing *response-contingent* feedback (cf. Nichols & Newman, 1986). As predicted, the correlation between pausing after punishment and passive avoidance errors was statistically significant ($r(38) = -.47$, $p < .01$). To explore this relationship more precisely, regression analysis was used to partial out the variance attributable to response speed after rewarded trials. Even after removing this largely redundant measure of response speed, response time after punishment accounted for a highly significant portion of the variance in passive avoidance errors, $r^2 = .21$, $F(38) = 9.92$, $p < .005$. This finding suggests that interruption of subjects' response set (i.e., slowing down), rather than response speed per se, bears an important association to learning from punished errors in this paradigm. In fact, there was essentially no relationship between overall response speed and performance on this task.

Because our measure of pausing or slowing down after punishment in Experiment 1 could not be dissociated from subjects' reaction to the stimulus presented during the next trial, a second experiment was conducted to explore the relation between pausing after punishment and passive avoidance learning. In Experiment 2, subjects were required to press a button when they wished to terminate response feedback and initiate the next trial. Thus, latency to terminate feedback was our measure of reflectivity. The results for the first two hypothesis were complicated by interactions involving subjects' level of neuroticism. Support for the hypotheses was limited to neurotic extraverts who responded more quickly after punishment and committed more passive avoidance errors than neurotic introverts; the corresponding group × type of feedback interaction for stable introverts and extraverts was not significant. Nevertheless, the most important question concerned the relation between reflectivity after punishment and learning from punished errors. Using the improved measure of reflectivity actually strengthened the association; after partialing out the effect of reflection after reward, reflectivity after punishment accounted for 28.5% of the variance, $F(1, 43) = 18.54$, $p < .001$. Figure 7 illustrates this relationship for each of the four groups formed by the interaction of extraversion and neuroticism. As in Experiment 1, the correlations between overall response speed and learning were small and nonsignificant.

The results from a recently completed study employing psychopathic

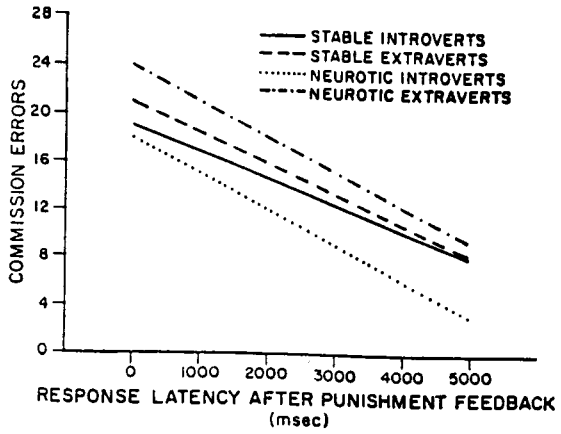

FIG. 7. The relation of passive avoidance learning to reflectivity following punishment as a function of personality (from Patterson, Kosson, & Newman, 1987).

and nonpsychopathic offenders (and the task from Experiment 2 above) provides additional evidence for the relation between reflectivity after punishment and passive avoidance learning. In this study, pausing after punishment accounted for 25% ($p < .001$) of the variance in commission errors after partialing out the effect for reflectivity following reward. This finding supports our earlier observation concerning the performance of prisoners on the WCST in which response latency after category shifts predicted learning.

A POTENTIAL MECHANISM FOR DISINHIBITION

The experimental results summarized to this point suggest a potential mechanism for the impulsive behavior of disinhibited subjects. First, as shown in Fig. 8, we propose that the deficient response modulation of disinhibited subjects is potentiated by a context of reward. It is as if the availability of reward produces in them an emotional/motivational state that is characterized by a readiness to respond and a resistance to altering their established response set. In the absence of any requirement to alter an established response set, disinhibited subjects will be likely to perform as well as controls and may even appear to be more focused, more accurate, and more efficient than controls (e.g., Jutai & Hare, 1983; Kosson & Newman, 1986a, 1986b). However, in the event that punishment indicates that subjects must alter their response set, disinhibited subjects will appear less responsive. However, in spite of their apparent lack of response to the feedback, we assume that disinhibited and nondisinhibited subjects alike experience an increment in arousal and concomitant increase

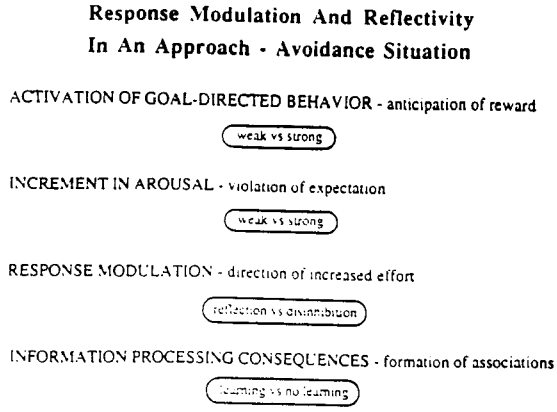

FIG. 8. Outline of a potential mechanism for the impulsive behavior of disinhibited subjects.

in effort following unexpected feedback (see Gray, 1971). The occurrence of negative feedback and subjects' rudimentary reaction to the feedback constitutes the second component of the mechanism.

The third component of the mechanism concerns the investment of subjects' increased effort. To the extent that negative feedback produces an emotional response, it will produce a more effortful allocation of attention to either (a) their original goal-directed behavior or (b) the process of reconciling their expectation with the unanticipated feedback. Whereas negative feedback will normally interrupt the approach behavior of controls and instigate information processing, we propose that the reaction of disinhibited subjects is less likely to involve alteration of their response set and is therefore more likely to involve response facilitation. To the extent that a subject pauses to process the feedback, we would label this reaction *reflective* behavior. To the extent that subjects display an increase in the vigor of ongoing behavior as opposed to switching the focus of their attention, we would label this reaction *disinhibited* behavior.

The fourth component of the mechanism involves the consequences of a reflective vs disinhibited reaction to negative feedback. Obviously, a tendency to reflect upon negative feedback will produce more extensive associations to the stimulus context. In addition, this same process may be expected to facilitate recognition of the stimulus context on subsequent occasions. To the extent that subjects encode the negative consequences of their original response to a particular stimulus context, and recognize similar situations on subsequent occasions, these situations will elicit caution and increase the likelihood that a different and more appropriate response will be emitted.

IMPLICATIONS FOR THE IMPULSIVE BEHAVIOR OF DISINHIBITED INDIVIDUALS

A deficit in response modulation of the type outlined in the mechanism could contribute to the expression of impulsive behavior in two ways: first, disinhibited subjects' immediate reaction to punishment may make them more likely to respond in a reflexlike manner in situations involving frustration or punishment feedback. Such responses would be rapid, lacking in forethought, and likely to be of poor quality. As such, they would tend to interfere with their performance in the immediate situation. A second pathway pertains to Shapiro's (1965) description of the impulsive style and is more associative in nature. Because the emotional reaction of disinhibited subjects may preclude adequate processing of unexpected negative experiences, their network of associations regarding such events will be fewer and less extensive. Consequently, in comparison to controls, their motivational/emotional response to any situation is more likely to be governed by the prospect of reward associated with the stimulus context than by the threat of punishment or failure. The importance of this second pathway transcends the immediate stimulus context and has obvious significance for an individual's personality and general response style.

Given that the syndromes of disinhibition vary in adaptiveness from the gregariousness of extraverts to the incorrigibility of psychopaths, an important criterion for the proposed mechanism concerns its ability to account for adaptive as well as maladaptive forms of impulsivity. In this regard, the consequences of a disinhibited reaction to negative feedback are likely to depend upon situational factors which pose requirements for information processing and/or response persistence. To the extent that a situation entails the necessity of altering response strategies in accord with changing environmental conditions, disinhibited subjects are likely to be at a relative disadvantage (e.g., Newman & Kosson, 1984; Newman, Patterson, & Kosson, 1987). To the extent that a situation requires subjects to persist in the face of frustration and/or cues for punishment, disinhibited subjects are likely to display greater persistence and fewer self-doubts (e.g., Pearce-McCall & Newman, 1986, Tiggemann, Winefield, & Brebner, 1982).

Finally, the proposed mechanism suggests that procedures designed to interrupt the dominant response set of disinhibited subjects should increase reflection and reduce their maladaptive responding. In fact, the results of two recent experiments provide preliminary evidence that interrupting their response set, either by temporarily removing the most salient cues for approach behavior (e.g., Patterson et al., 1987) or by preventing an immediate resumption of approach behavior after feedback

(e.g., Newman et al., 1987), does facilitate the processing of negative feedback and reduce the maladaptive approach behavior of disinhibited subjects.

REFERENCES

Chesno, F. A., & Kilmann, P. R. (1975). Effects of stimulation intensity on sociopathic avoidance learning. *Journal of Abnormal Psychology*, **84**, 144–150.

Brebner, J., & Cooper, C. J. (1974). The effect of a low rate of regular signals upon the reaction times of introverts and extraverts. *Journal of Research in Personality*, **8**, 263–276.

Brebner, J., & Cooper, C. J. (1978). Simulus- or response-induced excitation: A comparison of the behavior of introverts and extraverts. *Journal of Research in Personality*, **12**, 306–311.

Eysenck, H. J. (1967). *The biological basis of personality*. Springfield, IL: Thomas.

Eysenck, H. J. (1981). General features of the model. In H. J. Eysenck (Ed.), *A model for personality* (pp. 1–37). New York: Springer.

Eysenck, H. J., & Rachman, S. (1971). *The causes and cures of neurosis, 3rd Edition*. San Diego, CA: Robert R. Knapp.

Eysenck, S. B. G., & Eysenck, H. J. (1975). *Manual of the Eysenck Personality Questionnaire*. San Diego, CA: ITS Publishers.

Fowles, D. C. (1980). The three arousal model: Implications of Gray's two-factor learning theory for heart rate, electrodermal activity, and psychopathy. *Psychophysiology*, **17**, 87–104.

Gorenstein, E. E., & Newman, J. P. (1980). Disinhibitory psychopathology: A new perspective and a model for research. *Psychological Review*, **87**, 301–315.

Gray, J. A. (1971). *The psychology of fear and stress*. New York: McGraw–Hill.

Gray, J. A. (1972). The psychophysiological nature of introversion-extraversion: A modification of Eysenck's theory. In V. D. Nebylitsyn & J. A. Gray (Eds.), *Biological bases of individual behavior* (pp. 182–205). New York: Academic Press.

Gray, J. A. (1981). A critique of Eysenck's theory of personality. In H. J. Eysenck (Ed.), *A model for personality* (pp. 246–276). New York: Springer.

Gray, J. A. (1982). *The neuropsychology of anxiety*. New York: Oxford Univ. Press.

Hare, R. D. (1978). Electrodermal and cardiovascular correlates of psychopathy. In R. D. Hare & D. Schalling (Eds.), *Psychopathic behavior: Approaches to research* (pp. 107–144). New York: Wiley.

Hare, R. D. (1980). A research scale for the assessment of psychopathy in criminal populations. *Personality and Individual Differences*, **1**, 111–119.

Hare, R. D. (1984). Performance of psychopaths on cognitive tasks related to frontal lobe function. *Journal of Abnormal Psychology*, **93**, 133–140.

Howland, E. W., & Newman, J. P. (1985). Heart rate response following punishment feedback among extraverted and low-socialized college students. *Psychophysiology*, **22**, 581.

Howland, E. W., & Newman, J. P. (1987). *Introverts' and extraverts' reaction to punishment in a response contingent learning task: A psychophysiological analysis*. Manuscript submitted for publication.

Jutai, J. W., & Hare, R. D. (1983). Psychopathy and selective attention during performance of a complex perceptual-motor task. *Psychophysiology*, **20**, 146–151.

Kosson, D. S., & Newman, J. P. (1986a). Psychopathy and the allocation of attentional capacity in a divided-attention situation. *Journal of Abnormal Psychology*, **95**, 257–263.

Kosson, D. S., & Newman, J. P. (1986b, August). *Socialization and individual differences in the allocation of attention.* Presented at the meeting of the American Psychological Association, Washington, DC.

Newman, J. P., & Howland, E. W. (1987). *The effects of incentives on Wisconsin Card Sorting Task performance in psychopaths.* Unpublished manuscript.

Newman, J. P., & Kosson, D. S. (1984, August). *Behavioral inhibition deficits in extraverts.* Paper presented at the annual convention of the American Psychological Association, Toronto.

Newman, J. P., & Kosson, D. S. (1986). Passive avoidance learning in psychopathic and nonpsychopathic offenders. *Journal of Abnormal Psychology,* **95,** 252–256.

Newman, J. P., Patterson, C. M., & Kosson, D. S. (1987). Response perseveration in psychopaths. *Journal of Abnormal Psychology,* **96,** 145–148.

Newman, J. P., Widom, C. S., & Nathan, S. (1985). Passive-avoidance in syndromes of disinhibition: Psychopathy and extraversion. *Journal of Personality and Social Psychology,* **48,** 1316–1327.

Nichols, S. & Newman, J. P. (1986). Effects of punishment on response latency in extraverts. *Journal of Personality and Social Psychology,* **50,** 624–630.

Pearce-McCall, D., & Newman, J. P. (1986). Expectation of success following noncontingent punishment in introverts and extraverts. *Journal of Personality and Social Psychology,* **50,** 439–446.

Patterson, C. M., Kosson, D. S., & Newman, J. P. (1987). Reaction to punishment, reflectivity, and passive avoidance learning in extraverts. *Journal of Personality and Social Psychology,* **52,** 565–575.

Patterson, C. M., & Newman, J. P. (1987). *Reflectivity and learning from aversive events: Toward a psychological mechanism for the syndromes of disinhibition.* Unpublished manuscript.

Shapiro, D. (1965). *Neurotic styles.* New York: Basic Books.

Sutker, P. B., & Allain, A. N. (1987). Cognitive abstraction, shifting, and control: Clinical sample comparisons of psychopaths and nonpsychopaths. *Journal of Abnormal Psychology,* **96,** 73–75.

Tiggemann, M., Winefield, A. H., & Brebner, J. (1982). The role of extraversion in the development of learned helplessness. *Personality and Individual Differences,* **3,** 27–34.