The Impact of Motivationally Neutral Cues on Psychopathic Individuals: Assessing the Generality of the Response Modulation Hypothesis

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Psychopathic individuals' lack of responsiveness to punishment cues and poor self-regulation have been attributed to fearlessness (D. T. Lykken, 1957, 1962, 1995). Alternatively, deficient response modulation (RM) may hinder the psychopathic individual's processing of peripheral information and self-regulation when they are engaged in goal-directed behavior (C. M. Patterson & J. P. Newman, 1995). Although more specific than the fearlessness hypothesis in some respects, the RM hypothesis makes the more general prediction that psychopathic individuals will have difficulty processing motivationally neutral as well as fear-related stimuli. The authors assessed this prediction by using psychopathic and nonpsychopathic male inmates subdivided by level of anxiety/negative affectivity (NA). As predicted by the RM hypothesis, peripheral presentation of motivationally neutral cues produced significantly less interference in low-NA psychopathic individuals than in low-NA controls.

Psychopathic individuals are noted for their antisocial behavior and remorseless use of others. In contrast to nonpsychopathic offenders, the criminal behavior of psychopathic offenders is more frequent, more diverse, and less well-motivated (i.e., less easily explained by circumstances). Of significance, the psychopathic offender's profound adjustment problems occur despite average to above-average intelligence and social skills (see Hare, 1991). In light of their intact reasoning, good social skills, and absence of major psychopathology (Hart, Forth, & Hare, 1990; Hart & Hare, 1989), the psychopathic individual's profound maladjustment in school, employment settings, and interpersonal relationships is quite remarkable and warrants investigation.

Given the mismatch between the psychopathic individuals' apparent ability and actual performance in living, investigators have attributed their chronic maladjustment to willful misconduct or lack of motivation to conform (e.g., Lykken, 1995). Consequently, laboratory investigations of psychopathy have focused on motivational and emotional deficits that might interfere with the psychopathic offender's ability to profit from punishment or negative feedback. Using diverse methods, investigators have provided relatively consistent evidence that psychopathic offenders and nonpsychopathic offenders differ in their reaction to aversive stimuli at the behavioral (Lykken, 1957), psychophysiological (Hare, 1978), and emotional (Patrick, 1994; Patrick, Bradley, & Lang, 1993) level.

Without disputing the abundant evidence that psychopathic individuals are often less responsive to punishment cues, Newman and Wallace (1993) proposed that a cognitive or information-processing interpretation may provide a more accurate and more useful interpretation of their behavior. While noting parallels between their proposal and classic descriptions of the psychopathic individual's "cognitive style," the Newman and Wallace (1993) proposal relied primarily upon experimental evidence indicating that psychopathic individuals' insensitivity to punishment stimuli appears to be situation specific. Like others (i.e., Lykken, 1957; Siegel, 1978), we too find that psychopathic individuals are less likely than controls to revise a response strategy when changes in the experimental contingencies make continued responding maladaptive (e.g., Newman, Patterson, & Kosson, 1987) and have greater difficulty learning to inhibit punished responses (e.g., Newman, Patterson, Howard, & Nichols, 1990). However, we find that psychopathic individuals have no difficulty avoiding punishment when (a) avoidance learning is their only goal (i.e., there is no approach contingency; Newman & Kosson, 1986); (b) the avoidance contingency is made salient from the outset of the task (i.e., before participants have established a dominant response set for reward; Newman et al., 1990); or (c) positive and negative feedback are provided during an extended intertrial interval, thereby reducing the need for efficient processing of negative/avoidance feedback (Amst, Howland, Smith, & Newman, 1993; Newman et al., 1987).

This pattern of results suggests that psychopathic individuals may be relatively deficient in the processing of contextual information that is unexpected or peripheral to their dominant response set (i.e., the focus of ongoing, effortful attention). Following a more thorough discussion of the psychopathic individual's difficulty suspending ongoing behavior to process con-
textual cues, Patterson and Newman (1993) characterized the problem as deficient response modulation. Response modulation involves a rapid and relatively automatic (i.e., nonelaborate) shift of attention from the effortful organization and implementation of goal-directed behavior to its evaluation. Expanding upon this proposal, Newman and Wallace (1993) proposed that “a defect in the automatic processing that underlies this ability to detect, direct, and redirect attention in response to significant stimuli . . . provide(s) a cogent mechanism for the motivational, affective, and cognitive idiosyncracies” (p. 555) of the psychopathic individual.

The response modulation hypothesis resembles traditional explanations of psychopathy (e.g., Fowles, 1980; Hare, 1970; Lykken, 1982, 1995) in many respects, especially with regard to its ability to explain psychopathic individuals’ failure to accommodate negative feedback. However, the response modulation hypothesis is both more specific and more general than traditional accounts emphasizing low fear or insensitivity to punishment cues. With regard to specificity, the response modulation hypothesis predicts that the deficient avoidance learning of psychopathic individuals will be relatively specific to conditions requiring participants to suspend a dominant response set to process negative feedback, whereas hypotheses posulating low fear or insensitivity to punishment cues predict a more pervasive insensitivity to punishment stimuli and contingencies. With regard to generality, the response modulation hypothesis predicts a situation-specific deficiency in the processing of contextual cues regardless of whether these stimuli involve threat of punishment, whereas hypotheses involving low fear or insensitivity to punishment cues yield predictions that are specific to punishment stimuli. To date, we have attempted to contrast the response modulation and low fear hypotheses by examining the conditions under which psychopathic individuals display self-regulatory deficits (i.e., the specificity issue). Although additional research is needed, a number of studies support the more situation-specific predictions generated by the response modulation hypothesis (see Newman & Wallace, 1993).

The purpose of this investigation is to evaluate the generality aspect of the response modulation hypothesis by examining whether psychopathic individuals are relatively unresponsive to contextual cues that are peripheral to their dominant response set (i.e., primary task) even though the cues are unrelated to punishment (i.e., motivationally neutral). Toward this end, we selected a version of the picture-word task developed by Gernsbacher and Faust (1991) that is well suited to evaluating individual differences in the processing of contextual cues. Briefly, participants are instructed to note whether two successively presented stimuli are conceptually related or not by pressing one of two buttons. Of relevance to our hypothesis, the first stimulus occurs in the presence of another stimulus (i.e., contextual cue) that is either related to or unrelated to the second stimulus. Although participants are instructed to ignore contextual cues, Gernsbacher and Faust (1991) demonstrated that the contextual cues interfere with task performance depending upon their relation to the primary stimuli and interstimulus interval (i.e., time between successively presented displays). Thus, the magnitude of this interference effect provides a measure of the extent to which participants are processing the contextual cues.

To the extent that psychopathic individuals are deficient in processing contextual cues while engaged in goal-directed behavior, they should be less susceptible to the interference effects displayed by normal (i.e., nonpsychopathic) participants (Gernsbacher & Faust, 1991). To test this hypothesis, we administered the task to male offenders from a minimum security prison assessed with the revised Psychopathy Checklist (PCL-R; Hare, 1991) and subdivided into high and low levels of anxiety/negative affectivity (NA) using the Welsh Anxiety Scale (WAS; Welsh, 1956).1 On the basis of prior work, a priori hypothesis testing focused on White psychopathic and nonpsychopathic offenders and controls with low WAS scores. To date, there is relatively little evidence regarding the validity of the PCL-R when used with African American inmates. Moreover, when investigators have attempted to replicate laboratory findings obtained with White psychopathic and nonpsychopathic offenders using African American inmates, the studies report similar, but weaker, evidence of group differences in African American participants (Kosson, Smith, & Newman, 1990; Thornquist & Zuckerman, 1955). Thus, it seemed most appropriate to test our hypothesis using White inmates and then examine the extent to which the findings would generalize to African American participants.

The rationale for excluding high-NA participants when testing our hypothesis stems from our conceptualization of psychopathy, is based on empirical evidence, and reflects our concern with ruling out trait anxiety/NA as an alternative explanation for our findings. Our conceptualization of psychopathy is based on the classic characterization of the construct provided by Cleckley (1976). According to Cleckley (1976), “the psychopath is nearly always free from minor reactions popularly regarded as ‘neurotic’ or as constituting ‘nervousness’” (p. 339). Indeed, Cleckley (1976) took pains to distinguish the psychopathic individual from another common class of offender whose antisocial conduct appears to “arise from emotional conflicts” (p. 256). The terms primary and secondary or primary and neurotic psychopathy have often been used to differentiate these subtypes (see Blackburn, 1983; Hare & Cox, 1978); although, in fact, investigators have used an array of labels and methods to achieve this distinction.

One of the more common means of distinguishing these subtypes involves the use of self-report questionnaires such as the WAS or the Taylor (1953) Manifest Anxiety Scale (Blackburn, 1975; Chernos & Kilman, 1975; Sutker, Archer, & Kilpatrick, 1981; Widom, 1976, 1978; cf. Hare & Cox, 1978; Lykken, 1995).2 Despite the names of these scales, Watson and Clark

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1 Although Watson and Clark (1984) identified trait anxiety as a central component of NA, trait anxiety is a more specific construct. They noted further that measures such as the WAS are more accurately regarded as assessing the broader construct of NA. Given the relationship between the constructs, however, it is unlikely that people earning low scores on the WAS would be labelled “trait anxious” using a more specific measure of trait anxiety.

2 In line with the tradition of using WAS scores to refine groups identified with the MMPI Psychopathic Deviate scale, Joseph P. Newman began using the WAS before the PCL was published in 1980 (Newman, 1979; see also Newman et al., 1985). The WAS was not used in Joseph P. Newman’s initial series of studies using the PCL (e.g., Newman & Kosson, 1986; Newman et al., 1987) because PCL scores alone were considered sufficient for identifying the primary psychopathic individual.
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Method

Participants

The participants were 56 African American and 68 White offenders from a minimum-security prison. All participants satisfying the inclusion criteria were invited to participate in the study. Prescreening of files as well as information collected during the interview was used to eliminate participants who were 40 or more years old, had been diagnosed with a psychosis or bipolar disorder diagnosis, were being prescribed psychotropic medication, or had performed below the 4th grade level on the standardized measures of reading and math achievement. The elements of informed consent were presented both orally and in written form. We informed potential participants that their decision to participate or to refuse would not be a matter of record and would have no impact on their status within the prison system.

We interviewed participants and then, following a review of their files, the interviewers rated them on the PCL-R. The PCL-R is a 20-item behavior checklist yielding scores that range from 0 to 40, which correspond to increasing similarity to the prototypical psychopathic individual. There is a wealth of evidence indicating that PCL-R ratings make, using a combination of clinical interview and file review information, are highly reliable and valid for White offenders (Hare, 1991). Interrater reliability (i.e., intraclass correlation) for this study was calculated on a subset of 27 offenders and found to be .87 across African American and White participants. Research comparing the performance of the PCL-R in African American and White offenders provides preliminary evidence for the validity of the PCL-R with African American offenders (Kosson et al., 1990), but it also reveals potential differences relating to the PCL-R's factor structure, personality correlates, and strength of association with passive avoidance learning (see also Thornquist & Zuckerman, 1995). For the purposes of this study, we selected participants without regard to race, but we used the conservative strategy of testing our hypothesis using the subsample of White inmates.

Following the interview, participants completed the Shipley Institute of Living Scale (SILS), a short but reliable estimate of intelligence (Zachary, 1986); the WAS, which was used to divide participants into high- and low-NA groups; and the Symptom Checklist-90 (SCL-90-R), which provides a rough index of psychopathology (Derogatis, 1992). Participants earned $5 for this portion of the study. After approximately 1 week, we recalled participants for a session of behavioral testing during which they performed the Gernsbacher and Fautz (1991) task and a visual search task in countbalanced order.

Fifty-two participants earned PCL-R scores in the psychopathic range (i.e., greater than or equal to 30); 32 scored in the middle range (i.e., between 22 and 30); and 40 scored in the nonpsychopathic range (i.e., less than or equal to 22). We subdivided psychopathic and nonpsychopathic participants into high- and low-NA groups using the median score on the WAS. The median score of 12 was similar to past research and resulted in 19 low-NA controls, 21 high-NA controls, 24 low-NA psychopathic individuals, and 28 high-NA psychopathic individuals. More specific characteristics of these subsamples are provided in Table 1. We used supplementary regression analyses using the WAS as a continuous variable to examine the extent to which our findings may be limited to analyses using a specific WAS cutpoint. The 32 participants earning PCL-R scores between 22 and 30 were used in supplementary regression analyses examining PCL-R factor scores only.

Picture–Word (P–W) Task

The P–W task used in this study is a modified version of the task used by Gernsbacher and Fautz (1991, Experiment 3). Mark Faust provided us with a PC version of the software and Morton Gernsbacher advised us in the proper use of the task. In contrast to Gernsbacher and Fautz (1991), we (a) used only one set of stimuli (those which yielded the

(Hare, 1990). However, we rescored WAS scores to supplement psychopathy ratings when it became apparent that, despite using the PCL, deficient passive avoidance (the time qua non of the psychopathic deficit) was relatively specific to comparisons involving low-WAS psychopathic individuals and controls (Newman et al., 1990).
Table 1

<table>
<thead>
<tr>
<th>Measure</th>
<th>Low-NA psychopathic</th>
<th>Low-NA control</th>
<th>High-NA psychopathic</th>
<th>High-NA control</th>
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</thead>
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<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>PCL-R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>33.5</td>
<td>3.2</td>
<td>17.4</td>
<td>4.3</td>
</tr>
<tr>
<td>White</td>
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<td>16.1</td>
<td>5.3</td>
</tr>
<tr>
<td>WAS</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>2.7</td>
<td>5.3</td>
<td>3.1</td>
</tr>
<tr>
<td>White</td>
<td>5.5</td>
<td>2.5</td>
<td>5.3</td>
<td>3.2</td>
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<tr>
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</tr>
<tr>
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<td>82.5</td>
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<tr>
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<td></td>
</tr>
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<td>.50</td>
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</tr>
<tr>
<td>White</td>
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<td>.47</td>
<td>.200</td>
<td>.42</td>
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</tbody>
</table>

Note. NA = negative affectivity; PCL–R = Psychopathy Checklist–Revised; WAS = Welsh Anxiety Scale; SILS = Shipley Institute of Living Scale; GSI = General Symptom Index.

largest interference effects in prior research); and (b) modified the task so that participants earned 1 to 5p, depending upon the speed of their responses. We provided incentives to enhance motivation and to facilitate formation of a dominant response set.

The task consists of 160 trials. Half of the trials involve comparing two words to determine if they are related, and the other half involve comparing two pictures to determine if they are related. Trials are initiated by a P on picture trials and a W on word trials. This 1000-ms warning stimulus alerts participants to focus on the picture or word component of the following display and thus establishes a dominant response set. Following the warning stimulus and a 1000-ms interstimulus interval, a context display is presented for 700 ms, followed by a variable interval (50 ms or 1000 ms), and then finally the test display. The test display remains on the screen until either the participant responds or 2000 ms elapse.

As shown in Figure 1, each context display contains a line drawing and a superimposed word presented simultaneously. The drawing and word are always unrelated. The test display is simply another picture (without a superimposed word) on picture trials or another word (without a picture) on word trials. According to the type of trial, participants must decide whether the word or the picture shown in the test display is related to the word or picture that was presented in the context display. On picture trials, therefore, participants must focus on the picture in the context display and ignore the word and vice versa for word trials. Following Gernsbacher and Faust (1991), participants were instructed to press one button with their left index finger if the stimuli were related and a second button with their right index finger if they were not related.

The 160 trials include three types: experimental, comparison, and filler trials. In the 40 experimental trials, the to-be-ignored component of the context display is conceptually related to the test display, whereas the to-be-attended-to component is unrelated to the test display. Thus, the correct answer is unrelated, but participants may have difficulty rejecting the potential relationship because the (to-be-ignored) contextual cues prime related associations. Each set of experimental trials is matched by a set of comparison trials. The only difference between experimental and comparison trials is that the to-be-ignored component of the context display in all 40 comparison trials is also unrelated to the test display (see Figure 1). The comparison trials provide a means of assessing whether the meaning of the contextual cues is interfering with decision making on the experimental trials. For example, an experimental trial may involve a picture of a hand with the word “RAIN” superimposed as the context display and a picture of an umbrella as the test display. The corresponding comparison trial might involve a picture of a hand with the word “SUN” superimposed and the same test display. In both cases, the correct answer is unrelated, but associations elicited by RAIN have been shown to slow reaction times under these circumstances (Gernsbacher & Faust, 1991). In the 80 filler trials, the to-be-attended-to component of the context display is conceptually related to the test display, and the to-be-ignored component is unrelated. These displays, which merit the related response, are included so that the baseline for related and unrelated responses is equated.

In addition to varying the relation between the context and test displays, another crucial variable concerns the time between the offset of the context display and the onset of the test display (i.e., interstimulus interval, ISI). A fixed but quasirandomized schedule of trials ensures that the ISI is 50 ms for one-half of the trials and 1000 ms for the other half. The measure of primary interest is the interference score, which is computed by subtracting participants’ average response latency on comparison trials from their average response latency on experimental trials. At the 50-ms ISI, the interference score affords an index of the extent to which relatively automatic associations elicited by the to-be-ignored stimuli interfere with rejecting the test display. Gernsbacher and Faust (1991) reported significant interference at the 50-ms ISI across groups despite providing participants with explicit instructions to ignore these stimuli. At the 1000-ms ISI, their “normal” participants displayed minimal interference. Thus, hypothesis testing in this study focused on interference at the 50-ms ISI.

Throughout the experiment, a filled white (9 × 9 cm) square, bordered with a 2-mm blue line, occupies the center of the otherwise black computer screen. All displays are presented inside the blue border of the white square. After each trial, participants receive feedback. For correct responses, they receive the message “Correct” with a value $0.01 to $0.05 (centered below) indicating amount earned. For incorrect responses, they receive the message “Wrong.” Participants complete 23 practice trials (not analyzed) before performing the actual experiment. Only participants performing the task with 75% accuracy or better are included in this report.1

1This criterion resulted in 15 African American and 6 White participants being excluded from the study. For African American participants, we eliminated 5 participants from the low, middle, and high psychopathy groups and, in each case 2 were low-NA and 3 were high-NA. For
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![Figure 1](image.png)

<table>
<thead>
<tr>
<th>PICTURE TRIAL</th>
<th>Test Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAIN</td>
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</tr>
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<td>SOUP</td>
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</table>

<table>
<thead>
<tr>
<th>WORD TRIAL</th>
<th>Test Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>MONTH</td>
<td>SWEEP</td>
</tr>
<tr>
<td>MONTH</td>
<td>SWEEP</td>
</tr>
</tbody>
</table>

*Figure 1.* Sample picture and word trials including experimental trials (i.e., related contextual cues) and comparison trials (i.e., unrelated contextual cues).

**Results**

Before analyzing the effect of contextual cues on interference, we conducted 2 (psychopathic or nonpsychopathic individual) × 2 (high- or low-NA) × 2 (African American or White) ANOVAs (analyses of variance) to determine whether our groups differed in intelligence as measured by the SILS or general psychopathology as measured by the SCL-90-R. Means and standard deviations for these, as well as the other descriptive variables, are presented in Table 1. The analysis of intelligence revealed a main effect for Race, $F(1, 84) = 20.44, p < .0001$ with White individuals earning higher scores, and a significant Psychopathy × NA interaction, $F(1, 84) = 5.22, p = .025$. Examination of Table 1 reveals that, collapsing across race, low-NA psychopathic individuals earned higher scores than low-NA controls, whereas high-NA psychopathic individuals earned lower scores than high-NA controls. Analysis of the global severity index of the SCL-90-R revealed a significant main effect for NA, $F(1, 63) = 31.39, p < .0001$, and a significant Psychopathy × NA interaction, $F(1, 63) = 5.18, p = .026$. Whereas low-NA psychopathic individuals endorsed more symptoms than low-NA controls, high-NA psychopathic individuals endorsed fewer symptoms than high-NA controls.

Because of the significant effects noted above, we used correlational analyses and analyses of covariance to evaluate their potential significance for task performance. Correlations between SILS and SCL-90-R scores with the four interference measures ranged from $-0.163$ to $+0.152$, all $p > .10$. Using them as covariates in the interference analyses reported below had no meaningful effect on the results.

**Analyzing the Effects of Contextual Cues**

We assessed the effect of contextual cues by examining the extent to which they interfered with task performance. Interference, in turn, was assessed by subtracting a participant’s response latency to unrelated trials containing unrelated contextual cues (i.e., comparison trials) from his response latency to unrelated trials containing related contextual cues (i.e., experimental trials). Interference was evaluated using a 2 (psychopathic or nonpsychopathic individual) × 2 (high- or low-NA) × 2 (African American or White) × 2 (picture or word trial) × 2 (short or long ISI) ANOVA. Overall, participants responded 13 ms slower when contextual cues were related to test displays than when they were not, $F(1, 84) = 9.33, p = .003$. However, this interference effect was modified by ISI, $F(1, 84) = 6.81, p = .011$, with greater interference at the short (24 ms) than at the long (2 ms) ISI; by Type of Trial, $F(1, 84) = 19.26, p < .0001$, with greater interference on picture trials (i.e., words as contextual cues; 33 ms) than on word trials (−6 ms); and by the ISI × Type of Trial interaction, $F(1, 84) = 14.16, p = .0003$. The interaction indicates that interference was greater for the short ISI picture trials (60 ms) than for the short ISI word trials (−12 ms), whereas interference was essentially equal and nonexistent during long ISI picture (5 ms) and word (0 ms) trials. Finally, there was a significant Psychopathy × NA × ISI interaction, $F(1, 84) = 9.41, p = .003$, indicating that low-NA controls experienced more interference (68 ms) than low-NA psychopathic individuals (4 ms) on short ISI trials, whereas the reverse was true for long ISI trials (11 ms vs. 21 ms). By contrast, high-NA controls (13 ms) experienced less interference than high-NA psychopathic individuals (23 ms) on short ISI trials, but more interference (5 ms vs. −17 ms) on long ISI trials.

**Hypothesis Testing**

As noted in the Participants section, we planned to test hypotheses using the subsample of White inmates. However, in the interest of providing maximal information, we will present analyses for the combined samples followed by separate analyses for White and African American participants. In addition to using ANOVAs, secondary analyses used hierarchical multiple regression. Although these analyses are less complete because they only examine interference at the short ISI and collapse across type of trial, they are reported to address potential concerns about the use of a median split to subdivide participants into high- and low-NA groups.

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White participants, 2 low-NA and 3 high-NA controls failed to meet this criterion. After eliminating these participants, 124 participants were available for analysis.
Combined analyses. Although the overall ANOVA yielded a number of significant main effects and interactions, none of the effects involving race or type of trial interacted with the grouping variables. Thus, data were collapsed across race and trial type. Mean interference for each of the four groups is reported in Table 2. Although a priori hypothesis testing was restricted to the White subsample, our general hypothesis was that low-NA psychopathic individuals would display less interference than low-NA controls at the 50-ms ISI. Consistent with this hypothesis, low-NA psychopathic individuals displayed significantly less interference on short ISI trials than did low-NA controls, *t*(41) = 2.46, *p* < .02, two-tailed (effect size, *d* = .755). A comparable comparison involving long ISI trials was not significant, *t*(41) < 1.0.

We also examined individual participants’ data to determine the percentage of participants who did or did not display interference at the short ISI using an interference score of 0 as the cutoff. Whereas 15 of the 19 (79%) low-NA controls displayed interference, only 10 of the 24 (42%) low-NA psychopathic individuals showed interference (see Table 2). A test of the difference between these proportions was statistically significant (z = 2.46, *p* < .02).

To examine the consequences of treating NA as a continuous variable, we used hierarchical regression with total interference (i.e., collapsing across type of trial) during short ISI trials as the dependent variable. We entered psychopathy (psychopathic, nonpsychopathic individual), WAS (using the entire range of scores), and their interaction. The Psychopathy × NA interaction accounted for 6.6% of the variance (*p* < .01) beyond the 2.7% accounted for by psychopathy and NA. Neither psychopathy nor NA, regardless of entry order, accounted for a significant proportion of the variance in interference.

We also used hierarchical regression to examine the contributions of the two PCL-R factors. Harpur, Hare, & Hakstian (1989) identified two correlated PCL-R factors that appear to have distinct correlates. Factor 1 has been associated with callous, remorseless use of others, whereas factor 2 has been associated with having an antisocial lifestyle and is more closely related to the diagnosis of antisocial personality disorder. For the purposes of this analysis, we included an additional 32 participants with PCL scores between 22 and 30 so that the PCL-R factors could be treated as continuous variables. Neither factor nor their interaction accounted for a significant proportion of the variance regardless of entry order.

Analysis of White participants. A 2 (psychopathic or nonpsychopathic individual) × 2 (high- or low-NA) × 2 (picture or word trial) × 2 (short or long ISI) ANOVA that included White participants only revealed the same three-way (i.e., Psychopathy × NA × ISI) interaction observed in the combined analysis, *F*(1, 50) = 5.01, *p* = .03. No other main effect or interaction involving psychopathy or NA reached statistical significance.

We used a planned comparison (*t* test) to test our hypothesis that low-NA psychopathic individuals would display less interference than low-NA controls at the short ISI. As shown in Figure 2, low-NA controls responded an average of 58 ms slower when contextual cues were related to test displays, whereas low-NA psychopathic individuals responded an average of 18 ms faster. This difference yielded *t*(22) = 2.42, *p* < .05, two-tailed (effect size, *d* = .988). A comparable comparison involving long ISI trials was not significant, *t*(22) < 1.0.

We also analyzed the data for individual participants to determine the percentage of White participants who did or did not display interference at the short ISI. As shown in Figure 3, only 3 of the 12 (25%) low-NA psychopathic individuals displayed interference, compared with 9 of the 12 (75%) low-NA controls (z = 2.46, *p* < .02).

The hierarchical regression analysis involving psychopathy, NA, and their interaction revealed a significant Psychopathy × NA interaction accounting for 12.5% of the variance (p = .007) beyond the 8% accounted for by psychopathy and NA. Neither psychopathy nor NA, regardless of their entry order, accounted for a significant proportion of the variance in interference. The hierarchical regression involving the factor scores yielded no significant effects.

Analysis of African American participants. With African American participants only included, a 2 (psychopathic or nonpsychopathic individual) × 2 (high- or low-NA) × 2 (picture or word trial) × 2 (short or long ISI) ANOVA revealed the same three-way interaction observed in the analysis of White participants, *F*(1, 34) = 4.21, *p* = .048. No other main effect or interaction involving psychopathy or NA reached statistical significance.

As for White participants, we used *t* tests to compare mean interference observed in low-NA psychopathic individuals and controls. Although mean differences at the short ISI were only slightly smaller than those found in White participants (79 ms for low-NA controls vs. 26 ms for low-NA psychopathic individuals), the effect was not statistically significant in this sample, *t*(17) = 1.14 (effect size, *d* = .542). The corresponding com-

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4 An anonymous reviewer suggested that the predicted difference between low-NA psychopathic individuals and controls was due primarily to the performance of low-NA controls. To address this concern, we conducted a series of ANOVAs using the White inates and interference at the short ISI as the dependent variable. When we dropped low-NA psychopathic individuals from the analysis, there was no longer a significant effect for group. In contrast, dropping low-NA controls from the analysis did not eliminate the main effect for group. Moreover, an ANOVA comparing low-NA psychopathic individuals to the other three groups combined yielded a significant interaction, *F*(1, 52) = 5.48, *p* < .025, and comparing the two high-NA groups combined yielded an *F*(1, 40) = 3.96, *p* = .05. These findings indicate that support for our hypothesis was not solely attributable to the performance of low-NA controls.

5 Gemsbacher and Faust (1991) found that poor comprehenders (identified by a reading test) were less adept than good comprehenders at suppressing interference at the long ISI. Some may find it tempting to speculate that psychopathic individuals might resemble poor comprehenders but we caution against such comparisons. First, our psychopathic group performed at least as well as our control group on a measure of intelligence. Second, although we did not assess reading skill in this study, we recently administered a shortened version of the Gemsbacher and Faust (1991) reading test to another group of participants who were assessed with the PCL-R. As with intelligence, low-anxious psychopathic individuals performed at least as well as controls. Finally, poor comprehenders were found to show interference at the short ISI whereas the low-anxious psychopathic individuals in this study did not.
Table 2

Task Performance

<table>
<thead>
<tr>
<th>Measure</th>
<th>Low-NA psychopathic (n = 12, 12)</th>
<th>Low-NA control (n = 7, 12)*</th>
<th>High-NA psychopathic (n = 9, 19)*</th>
<th>High-NA control (n = 10, 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Interference African American</td>
<td>26</td>
<td>86</td>
<td>79</td>
<td>73</td>
</tr>
<tr>
<td>White</td>
<td>−18</td>
<td>22</td>
<td>58</td>
<td>82</td>
</tr>
<tr>
<td>Total correct</td>
<td>138.7</td>
<td>7.0</td>
<td>139.6</td>
<td>9.9</td>
</tr>
<tr>
<td>African American</td>
<td>139.3</td>
<td>8.3</td>
<td>140.1</td>
<td>7.0</td>
</tr>
<tr>
<td>White</td>
<td>58%</td>
<td>86%</td>
<td>67%</td>
<td>60%</td>
</tr>
<tr>
<td>% showing interference</td>
<td>25%</td>
<td>75%</td>
<td>74%</td>
<td>55%</td>
</tr>
</tbody>
</table>

Note. NA = negative affectivity; Total correct = number correct out of 160 trials; Interference = response times on short interstimulus interval (ISI) trials with related contextual cues – response times on short ISI trials with unrelated cues.

* n = number of African American and White participants per group, respectively.

The data for these comparisons are shown in Figure 4.

We also analyzed data for individual participants to determine the percentage of African American participants who did or did not display interference at the short ISI. As shown in Figure 5, only 7 of the 12 (58%) low-NA psychopathic individuals displayed interference, compared with 6 of the 7 (86%) low-NA controls. This difference failed to reach significance (z = 1.25).

Neither the hierarchical regression analysis involving psychopathy, NA, and their interaction nor the analysis involving the PCL-R factor scores yielded any statistically significant effects.

Discussion

The purpose of this experiment was to assess the relatively automatic effects of motivationally neutral cues on the response times of psychopathic individuals and controls. As predicted, such cues engendered significantly less interference in low-NA White psychopathic individuals than in low-NA controls. Moreover, the group means indicate that low-NA controls displayed levels of interference that were comparable to those found in nonincarcerated samples (e.g., Gernsbacker & Faust, 1991), whereas low-NA psychopathic individuals failed to display the usual interference effect. Analyses using proportion of partici-

Figure 2. Interference (in milliseconds) for White low negative affectivity psychopathic individuals and controls by condition. RT = response time; ISI = interstimulus interval.
p Ro 

...
more specific, proposal. Though much work is needed to determine how psychopathic individuals' failure to accommodate peripheral information may relate to components of automatic processing, we believe that this perspective has considerable promise for clarifying psychopathic individuals' problems in self-regulation.

The ubiquitous Psychopathy × NA interactions observed in this study also merit discussion. As already noted, such interactions are common in research reporting poor passive avoidance in psychopathic individuals (e.g., Chesno & Killmann, 1975; Newman et al., 1990). Aside from its role in moderating psychopathy effects, the construct of anxiety is important in psychopathy research because proponents of the low fear (e.g., Lykken, 1995) and related hypotheses (e.g., Fowles, 1980, 1993) maintain that psychopathy is ultimately a consequence of low fear/anxiety or a weak behavioral inhibition system (BIS) to adopt Gray's (1987) terminology. In principle, such proposals may be easily tested by assessing whether psychopathic individuals obtain low scores on measures of anxiety or perform like low-anxious participants on relevant measures. Unfortunately, evaluating the relation between psychopathy and anxiety is complicated by the fact that investigators have used diverse measures to operationalize the anxiety concept. Lykken (1957; 1995), for instance, equated anxiety with fear and advocates using Tellegen's (1982) Harm Avoidance Scale (HA) to measure it. Watson and Clark (1984), on the other hand, related HA to Zuckerman's (1971) Thrill and Adventure Seeking Scale and noted that these measures of fearlessness are entirely unrelated to anxiety/NA demonstrating, in their words, "the utility of the classic distinction between the states of fear and anxiety" (p. 469).

Fowles (1993) associated anxiety with Barlow's (1988) "anxious apprehension," which is defined as "a diffuse cognitive-affective structure including negative affect, high arousal, perceptions of helplessness or uncontrollability of future events, and worry" (p. 3). This is contrasted with Barlow's concept of fear, which he related to an alarm reaction. Fowles (1993) related anxious apprehension to Gray's BIS and advocated the use of Schalling's Psychic Anxiety Scale (PA; Schalling, 1978) to operationalize this construct. In light of Barlow's description of anxious apprehension and the fact that PA is highly correlated with WAS, Fowles' (1993) concept of anxiety would seem to be highly related to NA and largely independent of fear. This interpretation of anxiety is also consistent with Gray's (1987) statement that his BIS construct corresponds to scores on the Taylor Manifest Anxiety Scale (TMAS; Taylor, 1953) which, like the WAS, is a prototypical measure of anxiety/NA (Watson & Clark, 1984).

Because we used the WAS to measure anxiety and did not use a measure of fearlessness in this study (e.g., HA), we cannot address these alternative perspectives. Nevertheless, it is
worth noting that (a) there was no main effect for WAS in the interference analyses; and (b) controlling for level of anxiety (i.e., comparing low-NA groups only), psychopathic individuals displayed less interference than controls, whereas when controlling for psychopathy (i.e., comparing only nonpsychopathic groups), low-NA participants displayed greater interference than high-NA participants. Thus, although the predicted psychopathy effect was associated with weaker interference, low anxiety/NA was associated with greater interference. To the extent that the WAS, like the TMAS, provides a useful index of the BIS as proposed by Gray (1987), such findings suggest that the hypothesized differences in interference observed in this study should not be attributed to a weak BIS. Additional research is needed to determine whether the weak interference displayed by low-NA psychopathic individuals in this study could be explained by differences in fearfulness.

Another consideration regarding the significant Psychopathy × NA interactions observed in this and other studies concerns the factor structure of the PCL-R (Harpur et al., 1989). Because NA is negatively correlated with Factor 1 and positively correlated with Factor 2 (Hare, 1991), it is possible that the importance of focusing on low-NA psychopathic individuals relates to their potentially greater Factor 1 scores. To address this concern, we used hierarchical regression to assess whether the PCL-R factors were sufficient to predict performance without considering WAS scores. Regardless of their order of entry, however, neither factor accounted for a significant proportion of the variance in the processing of contextual cues. Thus, there is no evidence that PCL-R factor scores underlie the significant Psychopathy × NA interactions observed in this study.

The results of this study provide good support for our hypotheses, but there are important limitations that merit discussion. First, our findings did not clearly generalize from White to African American participants. As already noted, prior research with African American and White offenders raises questions about the wisdom of aggregating data across race (e.g., Jordan, Schlenker, Fairbank, & Caddell, 1996; Kosson et al., 1990), which is why our a priori hypothesis testing focused on White offenders. Although race was not found to qualify the significant psychopathy by NA interaction observed in the overall ANOVA, supplementary analyses involving African Americans only did not reach conventional levels of statistical significance. These findings are similar to those reported by Kosson et al. (1990) and Thornquist and Zuckerman (1995) with regard to passive avoidance learning in African American and White offenders. Despite relatively similar findings, group differences failed to reach statistical significance in the subsample of African American participants (see Kosson et al., 1990 for further discussion of this issue). In the present study, the lack of significance could reflect the smaller sample size, the weaker predictive validity of the PCL-R for African Americans, problems associated with using White interviewers and experimenters, or some combination of the above.

A second limitation is that our findings and associated theorizing pertain to low-NA psychopathic individuals only. Despite the a priori nature of this limitation, the fact that psychopathic individuals’ insensitivity to contextual cues was specific to comparisons involving low-NA groups further limits the generality of our findings. Moreover, our study does not allow a definitive interpretation of this limitation. We have considered three possibilities: One possibility is that high-NA psychopathic individuals are not “true psychopathic individuals” in the sense that
their behavior problems may reflect different etiological processes than those governing the behavioral problems of low-NA psychopathic individuals (see Hare & Cox, 1978). If this interpretation has merit, then collapsing across high- and low-NA groups would yield a heterogeneous sample and increase the risk of both Type 1 and Type 2 statistical errors. A second possibility is that NA often moderates the effects of psychopathy on performance depending upon the type of behavior being assessed. For instance, the exaggerated self-reflection associated with high NA (see Watson & Clark, 1984) may complement the psychopathic individual’s deficient reflectivity (Patterson & Newman, 1993) and reduce disinhibited behavior even though it leaves other correlates of psychopathy unchanged. A third reason why our findings may not generalize to comparisons involving high-NA psychopathic individuals and controls concerns the high-NA controls. Though dependent on the type of performance being assessed, high-NA individuals often perform more poorly than low-NA individuals (Chesno & Kilman, 1973; Watson & Clark, 1984). Consequently, the poor performance of high-NA controls rather than the superior performance of high-NA psychopathic individuals may explain why high-NA psychopathic individuals rarely perform more poorly than high-NA controls.9

A third limitation of this study concerns the fact that we did not assess handedness or counterbalance response buttons. All participants used their right hand to indicate that the successive displays were unrelated. Thus, a right-handed response was always used to assess interference by contextual cues, and we cannot dismiss the possibility that the observed group differences reflect differences in brain laterality that have been linked to psychopathy (Hare & McPherson, 1984; Hare & Jutai, 1988; Kosson, 1996). We have already initiated a study to address this limitation.

A fourth limitation of this study is that the significant effect for trial type, indicating greater interference on picture than on word trials, complicates interpretation of the interference data. Differences between picture and word trials have been observed in prior research (Gernsbacker, 1995; MacLeod, 1991; Newman, 1995) and probably relate to differences in speed of processing (see Theios & Anrhein, 1989). However, the fact that trial type did not interact with participant grouping variables suggests that low-NA controls displayed greater interference than low-NA psychopathic individuals on both trial types even though there was minimal interference on word trials. This result would seem to indicate that the interference measure used in this study was influenced by additional factors that did not interact with group. Although highly speculative, a potential explanation for this result is as follows. We propose that (a) interference effects at the short ISI are proportional to the depth of processing of contextual cues and that (b) verbal contextual cues are processed more deeply than pictorial contextual cues owing to the greater automaticity of reading words versus decoding pictures. Given these assumptions, it follows that participants would display greater interference on picture trials (i.e., with verbal contextual cues). Moreover, to the extent that low-NA psychopathic individuals are deficient in response modulation (i.e., process contextual cues less deeply), they would display weaker interference than low-NA controls on both types of trial.

As already noted, a major advantage of this study is that psychopathic individuals’ unresponsiveness to the motivationally neutral cues is not easily attributed to fearlessness, insensitivity to punishment cues, or lack of compliance. This is because the interference generated by contextual cues is reliably automatic, and there is no penalty for responding to the cues. However, this aspect of the task raises potential ambiguity with regard to interpretation. In contrast to passive avoidance tasks where insensitivity to punishment cues is maladaptive, psychopathic individuals’ lack of responsiveness to the contextual cues in this study was not. The adaptiveness of processing or failing to process contextual cues relates to the information carried by the cues and the consequences of processing or neglecting it. To the extent that the information is necessary for appropriate responding, failure to process the cues would be maladaptive. Conversely, if the cues are simply distracting, then reduced processing of the information may be an advantage (see also, Hare, 1978; Patterson & Newman, 1993). Thus, despite the fact that low-NA psychopathic individuals’ insensitivity to motivationally neutral cues parallels their insensitivity to punishment cues and may indicate a more general deficiency in the processing of peripheral information, we cannot rule out the possibility that their insensitivity to contextual cues in this study was deliberate (i.e., reflects an enhanced ability to focus attention or screen out irrelevant information; see Hare, 1978; Kosson, 1996).

The fact that low-NA psychopathic individuals were less affected by the meaning of contextual cues than low-NA controls is reminiscent of classic descriptions relating psychopathy to a type of semantic (Cleckley, 1976) or automatic (Shapiro, 1965) processing deficit that hampers their ability to appreciate and be guided by the meaning of their actions (see Wegner, 1994 for a related analysis). The present results suggesting that psychopathic individuals are deficient in the automatic processing of contextual cues are, therefore, consistent with clinical accounts of psychopathy and suggest an intriguing explanation for the core symptoms of psychopathy (as Newman, in press; Newman & Brinkley, 1997; Newman & Wallace, 1993). To the extent that deficient response modulation interferes with the automatic accommodation of peripheral cues when a person is engaged in goal-directed behavior, the person would, in essence, be unresponsive to a variety of contextual cues that ordinarily interrupt behavior and enable self-regulation (see also, Shapiro, 1965). In addition to elucidating the psychopathic individual’s situation-specific failure to inhibit inappropriate behavior that

9 An exception to this rule concerns assessments of emotional reactivity (e.g., electrodermal activity to punishment cues or symptoms of psychopathology) where the excessive reactivity of high-NA controls appears to augment group differences (see Annett et al., 1997). Similarly, the SCL-90-R scores in this study were strongly associated with NA, but this association was exaggerated in high-NA controls and muted in high-NA psychopathic individuals (see also, Fagan & Lira, 1980; Walker et al., 1991).
is normally regulated by fear (i.e., behaviors loading on Factor 2 of the PCL-R), difficulty processing cues that are peripheral to one’s goal-directed behavior (i.e., personal interests) might also explain the psychopathic individual’s apparent egocentrism, callousness, and pervasive insensitivity to the needs of others (i.e., behaviors that load on Factor 1 of PCL-R). In conclusion, we tentatively propose that this information-processing perspective (see A. J. Patterson & Newman, in press; Newman & Wallace, 1993; Patterson & Newman, 1993) represents a viable alternative to the fear- and punishment-related hypotheses that have dominated thinking about psychopathic behavior.

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