Deficient Response Modulation and Emotion Processing in Low-Anxious Caucasian Psychopathic Offenders: Results From a Lexical Decision Task

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The clinical and research literatures on psychopathy have identified an emotion paradox: Psychopaths display normal appraisal but impaired use of emotion cues. Using R. D. Hare’s (1991) Psychopathy Checklist—Revised and the G. S. Welsh Anxiety Scale (1956), the authors identified low-anxious psychopaths and controls and examined predictions concerning their performance on a lexical-decision task. Results supported all the predictions: (a) low-anxious psychopaths appraised emotion cues as well as controls; (b) their lexical decisions were relatively unaffected by emotion cues; (c) their lexical decisions were relatively unaffected by affectively neutral word-frequency cues; and (d) their performance deficits were specific to conditions involving right-handed responses. The authors propose that deficient response modulation may underlie both the emotional and cognitive deficits associated with low-anxious psychopaths.

On the basis of Cleckley’s (1976) classic portrayal of psychopathy, investigators have attributed psychopaths’ disinhibited and antisocial lifestyle to an emotion deficit (Blair, 1995; Hare, 1998; Lykken, 1957, 1995; McCord & McCord, 1964; Patrick, 1994). Consistent with this interpretation, psychopaths display less reactivity to threat cues (Lykken, 1957), anomalous performance in an emotion-modulated startle paradigm (Patrick, Bradley, & Lang, 1993), less autonomic arousal in response to interpersonal distress cues (Blair, Jones, Clark, & Smith, 1997), and less pronounced attention and memory effects associated with emotional cues relative to nonpsychopathic controls (Christiansen et al., 1996; Day & Wong, 1996; Kiehl, Hare, McDonald, & Brink, 1999). Together, these findings provide compelling evidence that emotion cues are less likely to influence the behavior of psychopaths.

Although investigators have focused their attention on psychopaths’ emotion deficit, Cleckley’s (1976) writings also highlighted an emotion paradox between the psychopaths’ ability to appraise emotion cues and their inability to use emotion cues. That is, psychopaths demonstrate normal appraisal of emotional cues and situations in the abstract (i.e., verbal discussion), but they are deficient in using emotion cues to guide their judgments and behavior in the process of living.

Williamson, Harpur, and Hare (1991) found empirical support for the emotion paradox in psychopathy by using a lexical-decision task. The lexical-decision task requires participants to determine if a briefly presented letter string is a word or a nonword. Paralleling results for controls (Challis & Krane, 1988; Graves, Landis, & Goodglass, 1981; Strauss, 1983), nonpsychopathic offenders responded faster to emotion words than to neutral words. Psychopaths, however, did not demonstrate this emotion facilitation in response to positive or negative words although, similar to controls, they were more accurate at identifying the emotional words. Thus, in contrast to the
observed group differences in using emotion cues to facilitate task performance, Williamson and colleagues found no group differences in participants’ word ratings. Similarly, Patrick et al. (1993) assessed startle responses while participants viewed slides that varied in affective valence, and Patrick, Cuthbert, and Lang (1994) assessed electrodermal activity in response to tones that were cues for threat-related or neutral situations. In both studies, Patrick and colleagues observed significant differences in the physiological indices of emotion processing, but psychopaths and nonpsychopaths performed similarly in rating the pleasantness, arousal, and dominance of the fear-related situations and slide stimuli. Furthermore, in an investigation of children with psychopathic tendencies, this group demonstrated smaller electrodermal responses to distress cues than nonpsychopathic children, but the two groups did not differ when rating the valence of the cues (Blair, 1999; see also Blair et al., 1997). Taken together, these findings provide good empirical support for the emotion paradox: psychopaths can appraise emotion cues but such cues have little measurable influence on their behavior.

Although existing theories address emotion deficits in psychopaths, it is unclear how they account for the paradox. One potential explanation for these phenomena is the response modulation hypothesis (RMH; Gorrenstein & Newman, 1980; Newman, 1998; Newman & Lorenz, in press; Patterson & Newman, 1993). The RMH relates to Cleckley’s (1976) concept of psychopathy, which holds that genuine psychopaths are characterized by low levels of neurotic anxiety, absence of psychotic thinking, and good intelligence. Indeed, response modulation deficits have been found to be relatively specific to low-anxious psychopaths (see Newman & Brinkley, 1997). Response modulation is defined as a brief and highly automatic shift of attention that enables individuals to monitor and, if relevant, use information that is peripheral to their dominant response set (i.e., deliberate focus of attention). According to the RMH, the impulsivity, poor passive avoidance, and emotion-processing deficits of psychopathic individuals may all be understood as a failure to process the meaning of information that is peripheral or incidental to their deliberate focus of attention (Newman & Lorenz, in press). Consistent with the RMH, psychopathic individuals display adequate passive avoidance when avoiding punishment is their primary (i.e., sole) task but manifest performance deficits when avoidance requires them to process nondominant (i.e., secondary or latent) information (e.g., Lykken, 1957; Newman & Kosson, 1986).

Moreover, there is evidence that psychopaths are insensitive to secondary neutral as well as secondary emotional cues (Newman, Schmitt, & Voss, 1997).

Given the similarities between their emotional and more general information-processing deficits, it is possible that psychopaths’ emotion deficits, like their self-regulatory deficits, involve a deficiency in processing incidental cues. Indeed, Newman and Lorenz (in press) recently proposed that psychopaths’ deficits in emotion processing may be understood as a failure to process the associative networks primed by secondary emotion cues. Although emotion processing may operate effortlessly and automatically to influence the behavior of most individuals (e.g., Bower, 1981), we proposed that emotions are less likely to influence the behavior of low-anxious psychopaths because their emotion processing is more dependent on deliberate processing (i.e., less automatic). Restated, psychopaths may be less likely to activate and/or use the associative networks primed by peripheral emotional cues that other individuals use automatically.

With regard to the emotion paradox, then, the RMH is consistent with the hypothesis that psychopathic individuals (a) display normal emotion processing when instructed to attend to emotion stimuli and (b) are less influenced by emotion cues that are peripheral to their dominant response set (i.e., directed attention). Regarding emotion facilitation in a lexical-decision task, we presume that emotion words prime associational networks on the basis of their emotional valence (Balota & Chumbley, 1984; Bower, 1981) and, then, activate emotional characteristics that facilitate responding by rapidly indicating the presence of the stimuli in the mental lexicon. For instance, the word sunset may prime positive emotions that activate numerous words associated with happy, peaceful, and contented feelings. This rapid activation of a positive emotion makes it easier for the participant to identify the stimulus as a word. However, to the extent that psychopaths are deficient in processing incidental information as suggested by the RMH, they are less influenced by a word’s affective connotations.

Conceptualizing facilitation on the lexical-decision task in terms of response modulation, we used a modified version of the lexical-decision task employed by Williamson and her colleagues (1991) to replicate and extend their findings. On the basis of Cleckley’s (1976) conceptualization of psychopathy and past investigations of the RMH (see Newman & Brinkley, 1997; Schmitt & Newman, 1999b), planned comparisons focus on the performance of low-anxious (i.e.,
primary) psychopaths and controls. Nevertheless, we include the data for high-anxious groups in the overall analyses so that investigators interested in Hare’s (1991) psychopathy construct (high Psychopathy Checklist—Revised [PCL–R] scorers without regard for anxiety) can interpret out findings. Because separate planned comparisons (i.e., t tests) were conducted to test hypotheses using low-anxious groups only, they are unaffected by the inclusion of the high-anxious groups.

Given prior work demonstrating an emotion deficit in psychopaths, our first prediction was that low-anxious psychopaths would demonstrate less emotion facilitation than low-anxious controls. This prediction is consistent with the RMH and Williamson et al.’s (1991) findings that psychopaths demonstrated less emotion facilitation than controls in a lexical-decision task. In addition, based on prior work demonstrating comparable appraisal of emotion stimuli, we predicted that low-anxious psychopaths would not differ from low-anxious controls in rating the emotional valence of the words used in the lexical-decision task. Support for these two predictions would replicate earlier work demonstrating the emotion paradox in low-anxious psychopaths.

One interpretation of the psychopath’s deficient emotion facilitation is that they fail to access or elaborate the semantic and affective associations or networks primed by the stimulus words (Hare, 1998; Newman & Lorenz, in press). To the extent that this failure to process associative networks relates to response modulation as opposed to deficient emotion processing per se, psychopaths should be less influenced by emotionally neutral as well as emotional aspects of a word’s meaning. To test this third prediction, we examined the ability of low-anxious psychopaths to use an emotionally neutral secondary cue (i.e., word frequency) to facilitate performance on the primary lexical-decision task. Paralleling our prediction involving weaker emotion facilitation, we predicted that low-anxious psychopaths would demonstrate less frequency facilitation than controls.

Recent research by Kosson (1996, 1998) and colleagues (Howland, Kosson, Patterson, & Newman, 1993; Kosson & Harpur, 1997) suggests that psychopaths demonstrate performance anomalies on measures of attention when using their right hand as opposed to their left hand to respond. Although the more general literature on cerebral asymmetries in psychopaths is inconsistent (Hare, 1979; Hare & Forth, 1985; Hare & Jutai, 1988; Hare & McPherson, 1984; Hiatt, Lorenz, & Newman, in press; Jutai, Hare, & Con-
were excluded from participation if they were age 40 or older, currently taking psychotropic medication, or left-handed (total scores on Chapman Handedness Scale > 21; Chapman & Chapman, 1987). In addition, inmates were excluded from analyses if they scored below the 4th-grade level on prison achievement tests or had earned estimated Wechsler Adult Intelligence Scale—Revised (WAIS–R; Wechsler, 1981) scores that were less than 70 on the Shipley Institute of Living Scale (Zachary, 1986). Psychopathic and nonpsychopathic participants did not differ significantly on age or WAIS–R scores (low-anxious psychopaths: $M = 100.82, SE = 11.54$; low-anxious controls: $M = 99.63, SE = 11.87$; high-anxious psychopaths: $M = 98.04, SE = 11.01$; high-anxious controls: $M = 96.49, SE = 12.70$). Inmates were paid $3.00 for their participation in this study.

Psychopathy was assessed with the PCL–R (Hare, 1991), which has demonstrated good reliability and validity in Caucasian samples (Hare, 1996; Hare et al., 1990; Harpur, Hare, & Hakstian, 1989; Kosson, Smith, & Newman, 1990; Lorenz, Smith, Bolt, Schmitt, & Newman, 2001). In the current study, we evaluated the interrater reliability of PCL–R ratings with a subset of 31 participants. To provide a conservative estimate of the reliability, we calculated an intraclass correlation (ICC) using absolute rather than consistency agreement and treated both raters and participants as random effects (McGraw & Wong, 1996). This analysis yielded an ICC of .96.

Consistent with Hare (1991) and previous reports from our laboratory, participants with PCL–R scores greater than or equal to 30 were rated as psychopaths and those with PCL–R scores less than or equal to 20 were rated as nonpsychopathic controls. Anxiety was measured by the Welsh Anxiety Scale (Welsh, 1956). Individuals scoring above the median (11) were rated as high-anxious and individuals scoring below the median were rated as low-anxious. This median split resulted in 37 high-anxious (17 psychopaths and 20 controls) and 37 low-anxious (11 psychopaths and 26 controls) participants.2

**Stimulus Material**

The stimuli in the lexical-decision task consisted of 48 word–nonword pairs for the experimental trials. These stimuli consisted of 12 positive words, 12 negative words, 24 neutral words, and 48 nonwords and were grouped into four experimental blocks: A, B, C, and D. Each experimental block consisted of 3 positive, 3 negative, 6 neutral, and 12 nonwords. In addition, a practice block consisted of 12 neutral words and 12 nonwords that differed from the words used for the test trials.

The positive, negative, and neutral words for the experimental trials were selected from Rubin and Friendly’s (1986) word list. On scales that ranged from 1 (negative) to 7 (positive), the neutral words fell between 3.25 and 4.75 on the Goodness scale and under 2.0 on the Emotionality scale. Examples of neutral words were “bowl,” “event,” and “vacuum.” The positive and negative words were rated above 4.0 on the Emotionality scale and above 5.25 or below 2.75 on the Goodness scale, respectively. Examples of positive words were “kiss,” “sunset,” and “heaven.” Examples of negative words were “tomb,” “devil,” and “hostage.” As expected, the positive and negative words differed significantly from the neutral words on emotionality, $F(2, 47) = 135.70, p < .001$. The positive, negative, and neutral words differed significantly from each other on goodness, $F(2, 47) = 333.06, p < .001$. The words for the experimental trials were matched on frequency, pronounceability, length, number of letters, number of syllables, concreteness, and imagery (Kucera & Francis, 1967; Pavio, Yuille, & Madigan, 1968). Changing two letters for each of the words used in the experiment resulted in the 48 pronounceable nonwords.

For the word frequency analysis, the stimulus words for the four experimental blocks were regrouped into high-, medium-, and low-frequency word groups (Kucera & Francis, 1967). The three word groups differed significantly on frequency, $F(2, 47) = 12.88, p < .001$. Examples of the high-frequency words included heaven, injury, and piano; examples of the medium-frequency words included bowl, devil, and sunset; and examples of low-frequency words included dove, gore, and salute. These words were matched on length, pronounceability, number of letters, number of syllables, imagery,

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2 Because the median split resulted in more high-anxious than low-anxious psychopaths and more low-anxious than high-anxious controls, we also computed separate median anxiety scores for each group and reran all analyses with the separate medians. This procedure resulted in 22 low-anxious and 21 high-anxious controls and 15 low-anxious and 16 high-anxious controls. In all cases, the planned comparisons generated by these analyses yielded the same results. Although the cells in the latter analyses are better balanced, we report the a priori analyses because we believe that they are more readily interpreted.
concreteness, goodness, and emotionality (Kučera & Francis, 1967; Pavio et al., 1968; Rubin & Friendly, 1986).

A fixation point, "•", was presented in a central position on the computer screen for 500 ms. The stimuli were then presented in a central position on a computer screen for 100 ms. The participants responded by pressing either the “D” and “F” keys or the “J” and “K” keys on a standard keyboard. The “D” and “F” keys were used for left-hand responses and the “J” and “K” keys were used for right-hand responses. Participants used their index fingers to indicate if the presented stimulus was a word and their middle finger to indicate if the presented stimulus was a nonword. The “F” and “J” keys were covered with a small blue sticker and indicated that the presented stimulus was a word. The “D” and “K” keys were covered with a small white sticker and indicated that the presented stimulus was a nonword.

**Procedures**

A tester, who was unaware of group membership of the participants, was in the room with the participants running the computer program and administering the questionnaires. Participants were seated in front of a computer monitor and read the task instructions on the computer screen.

“This experiment involves focusing on a fixation point and then viewing a group of letters. Half of the time the letters will spell a word, and half of the time they will not. Your job is to press the blue dot if the letters spell a word or press the white dot if they do not spell a word. Respond as quickly as you can without making mistakes. Remember: Press the blue dot for words, the white dot for non-words. For this block, please use your right hand.”

All participants began the experiment with the practice block and responded with their right hand. The experimental blocks were presented in the following order: A, B, C, D, B, A, D, C, so that each stimulus word was presented twice. Participants alternated their response hand after each block so that each experimental block was completed once with the right hand and once with the left hand. Between each block, participants had a 10-s rest period. After the rest period, participants were instructed to prepare for the next block and were reminded of which hand to use for their responses. After completing the fourth block of experimental trials, the participants were given a 30-s break. The entire task lasted approximately 20 min.

After completing the lexical-design task, participants rated the stimulus words on a 0–7 scale, where 0 indicated bad, 4 indicated neutral, and 7 indicated good. (One participant did not complete the word-rating task.)

**Results**

**Preliminary Analyses**

Prior to analyzing emotion and frequency facilitation, we examined the data for group differences in overall reaction time (RT) and accuracy with two 2 (psychopathic, nonpsychopathic) × 2 (low-anxious, high-anxious) mixed-model analysis of variance (ANOVA), with psychopathy and anxiety as the between-participants factors and response hand as the within-participants factor. An additional set of 2 × 2 × 2 ANOVAs tested for RT or accuracy group differences in pseudowords. None of these analyses yielded significant main effects or interactions involving psychopathy. The raw RT data for emotion and frequency are provided in Table 1 and Table 2.

**Lexical-Decision Task: Emotion Analyses**

Using only RT values from correct responses, emotion facilitation on this task was computed by subtracting the RT for the emotional words from the RT for the neutral words. Higher RTs indicate greater facilitation on the task. We conducted a 2 (psychopathic, nonpsychopathic) × 2 (low-anxious, high-anxious) × 2 (left hand, right hand) mixed-model ANOVA with psychopathy and anxiety as the between-participants factors and response hand as the within-participants factor. This analysis yielded a significant Response Hand × Psychopathy interaction, $F(1, 70) = 4.27, p < .05$. Whereas nonpsychopaths displayed greater facilitation ($M = 35.36, SE = 5.44$) than psychopaths ($M = 8.62, SE = 6.65$) when responding with their right hand, nonpsychopaths ($M = 25.55, SE = 6.99$) and psychopaths ($M = 26.79, SE = 8.41$) displayed similar levels of facilitation when responding with their left hand. Owing to the large number of analyses conducted, we have focused on our a priori hypotheses in reporting the results. In addition, we report all the significant findings from the overall analyses that involve the psychopathy variable.

To test our first hypothesis, we compared the emotion facilitation of low-anxious psychopaths and controls. As predicted, low-anxious psychopaths dis-
played significantly less facilitation than controls, \( t(70) = 3.09, p < .001 \). (Low-anxious psychopaths: \( M = 7.71, SE = 8.75 \); low-anxious controls: \( M = 33.29, SE = 5.69 \).) This result is shown in Figure 1.

Word Ratings

To test for differences in word ratings, we conducted a 2 (psychopathic, nonpsychopathic) × 2 (low-anxious, high-anxious) × 3 (positive words, negative words, neutral words) mixed-model ANOVA with psychopathy and anxiety as the between-participants factors and word type as the within-participants factor. This ANOVA yielded a significant main effect for word type, \( F(1, 69) = 194.76, p < .001 \) (positive words: \( M = 5.37, SE = 1.00 \); neutral words: \( M = 4.26, SE = .72 \); negative words: \( M = 2.37, SE = 1.04 \)). Across groups, participants rated the positive words higher than the neutral words, which in turn were rated higher than the negative words. Neither the main effect nor any of the interactions involving psychopathy approached statistical significance. The planned comparison between the ratings of the negative and neutral words for the low-anxious psychopaths and controls yielded \( t(69) < 1.0, ns \); similarly, the ratings of the positive and neutral words for the low-anxious psychopaths and controls yielded \( t(69) < 1.0, ns \).

Lexical-Decision Task: Frequency Analyses

Frequency facilitation on this task was computed by subtracting the RT for the high-frequency words from the RT for the low-frequency words. Higher values indicate greater facilitation on the task. A 2 (psychopathic, nonpsychopathic) × 2 (low-anxious, high-anxious) × 2 (left hand, right hand) mixed-model ANOVA with psychopathy and anxiety as the between-participants factors and response hand as the within-participants factor yielded no significant main

| Table 1 | Means and (Standard Deviations) of the Reaction Time Raw Data for Emotional Stimuli |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Variable        | Neutral         | Positive        | Negative        | Nonwords        |
|                 | Left hand       | Right hand      | Left hand       | Right hand      | Left hand       | Right hand      | Left hand       | Right hand      |
| Low-anxious     |                 |                 |                 |                 |                 |                 |                 |                 |
| Psychopaths     | 512.09          | 500.73          | 496.36          | 494.46          | 487.73          | 516.27          | 587.73          | 605.00          |
| \( n = 11 \)    | (27.56)         | (29.48)         | (28.48)         | (29.06)         | (27.35)         | (28.56)         | (31.68)         | (37.79)         |
| Controls        | 558.42          | 565.34          | 526.15          | 532.46          | 532.85          | 522.92          | 633.81          | 645.50          |
| \( n = 26 \)    | (17.92)         | (19.18)         | (17.62)         | (18.25)         | (17.79)         | (18.58)         | (20.60)         | (24.58)         |
| High-anxious    |                 |                 |                 |                 |                 |                 |                 |                 |
| Psychopaths     | 545.35          | 537.20          | 511.75          | 505.20          | 511.90          | 525.45          | 631.80          | 631.40          |
| \( n = 17 \)    | (20.43)         | (21.87)         | (20.09)         | (20.81)         | (20.28)         | (21.18)         | (23.49)         | (28.03)         |
| Controls        | 533.89          | 532.41          | 517.00          | 505.65          | 506.41          | 493.06          | 644.89          | 609.12          |
| \( n = 20 \)    | (22.17)         | (23.72)         | (21.79)         | (22.57)         | (22.00)         | (22.97)         | (25.48)         | (30.40)         |

| Table 2 | Means and (Standard Deviations) of the Reaction Time Raw Data for Frequency Stimuli |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| Variable        | High frequency  | Low frequency   |                 |                 |
|                 | Left hand       | Right hand      | Left hand       | Right hand      |
| Low-anxious     |                 |                 |                 |                 |
| Psychopaths     | 479.93          | 517.58          | 526.96          | 503.50          |
| \( n = 11 \)    | (25.65)         | (29.09)         | (27.75)         | (32.44)         |
| Controls        | 520.30          | 527.97          | 575.63          | 574.63          |
| \( n = 26 \)    | (16.68)         | (18.92)         | (17.93)         | (21.10)         |
| High-anxious    |                 |                 |                 |                 |
| Psychopaths     | 509.91          | 505.86          | 553.36          | 549.32          |
| \( n = 17 \)    | (19.02)         | (21.57)         | (20.45)         | (24.06)         |
| Controls        | 500.00          | 507.35          | 556.94          | 539.17          |
| \( n = 20 \)    | (20.63)         | (23.40)         | (22.18)         | (26.09)         |
effects or interactions involving psychopathy. The planned comparison indicated that low-anxious psychopaths showed significantly less facilitation to the high-frequency words than did controls, \( t(70) = 2.35, p < .05 \). (Low-anxious psychopaths: \( M = 18.37, SE = 12.46 \); low-anxious controls: \( M = 51.82, SE = 8.10 \).) This result is shown in Figure 2.

**Lexical-Decision Task: Response Hand Analysis**

The significant Response Hand × Psychopathy interaction found in the overall ANOVA indicated that all psychopaths, regardless of anxiety group, demonstrated less emotion facilitation when responding with

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**Figure 1.** Lexical-decision task emotion facilitation for right- and left-handed responses for low-anxious psychopathic individuals and controls. RT = reaction time.

**Figure 2.** Lexical-decision task frequency facilitation for right- and left-handed responses for low-anxious psychopathic individuals and controls. RT = reaction time.
their right hand, but did not address our a priori hypotheses directly. Toward this end, we conducted two planned comparisons to examine whether the weaker emotion and frequency facilitation displayed by low-anxious psychopaths was specific to the right hand. As predicted, low-anxious psychopaths displayed significantly less emotion facilitation than controls when responding with their right hand, \( t(70) = 2.87, p < .01 \), (low-anxious psychopaths: \( M = -4.64, SE = 10.51 \); low-anxious controls: \( M = 37.65, SE = 6.84 \)), though the groups did not differ when responding with their left hand \((t < 1.0)\). In addition, low-anxious psychopaths demonstrated significantly less frequency facilitation than controls when responding with their right hand, \( t(70) = 2.84, p < .01 \), (low-anxious psychopaths: \( M = -14.01, SE = 18.39 \); low-anxious controls: \( M = 46.66, SE = 11.96 \)), though the groups did not differ when responding with their left hand \((t < 1.0)\). These findings are shown in Figures 1 and 2.

Supplemental Analyses

The PCL–R has been found to have a reliable two-factor structure (Hare, 1991; Harpur et al., 1989). Because previous studies identifying anomalous emotion processing in psychopaths have examined the relationship between emotion deficits and the factor scores of the PCL–R (Patrick et al., 1993; Patrick et al., 1994), we conducted supplementary analyses to examine the associations among PCL–R Factor 1, PCL–R Factor 2, and aberrant emotion processing.3 The results of these analyses are reported in Footnote 3 because they are peripheral to the primary hypotheses addressed in this study.

Discussion

The results of this study provide good support for all four experimental hypotheses. Clinical observation (Cleckley, 1976) and experimental research (e.g., Williamson et al., 1991) have highlighted a distinction between the psychopath’s ability to appraise versus to use emotion cues, which we have referred to as the emotion paradox. Consistent with previous research demonstrating the emotion paradox, low-anxious controls showed significantly greater emotion facilitation than low-anxious psychopaths (i.e., better utilization) on a lexical-decision task even though the two groups provided comparable appraisal of the emotion words. The fact that we replicated the Williamson et al. findings in an independent sample, despite using different experimental stimuli and other procedural changes, provides good support for our first two hypotheses and further demonstrates the situational specificity of the low-anxious psychopaths’ deficits in emotion processing (i.e., emotion paradox).

Paralleling our findings for the emotion analyses, and extending previous research, the results also supported our third hypothesis that word frequency would have a significantly greater effect on low-anxious controls than on low-anxious psychopaths. The basis of this prediction was a study reported by Newman et al. (1997) that involved a Stroop-like, picture-word task. Whereas the incongruent, affectively neutral, peripheral stimuli automatically influenced responding in low-anxious controls, they had virtually no effect on low-anxious psychopaths. Thus, the present findings provide a conceptual replication of this earlier finding and, in conjunction with these results, provide further evidence that psychopaths’ failure to use incidental–peripheral information is not limited to emotion cues.

The results of this study were also consistent with our fourth hypothesis that psychopaths’ weak facilitation would be specific to trial blocks performed with their right hand. This finding provides a conceptual replication of previous results indicating that psychopaths’ poor processing of incidental cues is specific to conditions that activate the left hemisphere primarily (Bernstein et al., 2000; cf. Kosson, 1996, 1998). To our knowledge, however, this study represents the first a priori test of the hypothesis that psychopaths’

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3 Supporting previous research demonstrating an association between PCL–R Factor 1 and emotion processing, Factor 1 scores, unlike Factor 2 scores, were significantly correlated with deficits in processing emotion cues. The zero-order correlations between Factor 1 and Factor 2 with the reaction time emotion facilitation score were \( r = -0.27, p < .01 \) and \( r = 0.00, ns \), respectively. When Factor 1 was entered at the first step of a regression analysis, it accounted for 7% of the variance of emotion facilitation (\( R^2 = 0.07 \)), \( F(1, 99) = 7.82, p < .01 \). Factor 2 scores entered at Step 2 and the interaction of Factor 1 and Factor 2 entered at Step 3 did not account for significant increases in variance. When we conducted another analysis entering Factor 1 scores at Step 2 after entering Factor 2 scores, Factor 1 scores accounted for a significant 9% of the variance in emotion facilitation (\( R^2 = 0.09 \)), \( F(1, 98) = 10.00, p < .01 \), whereas the effects of Factor 2 and the interaction were again not significant. For the sake of completeness, we repeated the same analyses using frequency facilitation as the dependent variable. These analyses yielded no significant results.
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deficits in response modulation relate to differential activation of the cerebral hemispheres.

The results of the current study contribute to the growing literature demonstrating an array of processing deficits in psychopathic individuals. This literature indicates that psychopaths (a) are less sensitive to incidental–secondary threat cues (e.g., Lykken, 1957; Newman & Kosson, 1986); (b) have emotion processing deficits (e.g., Patrick et al., 1993; Williamson et al., 1991); (c) display unusual cerebral asymmetries (see Hare, 1998); (d) are less sensitive to incongruent contextual cues that interfere with primary task performance in others (e.g., Newman et al., 1997); and (e) demonstrate language production and reception anomalies (see Hare, 1998). However, in all cases, there is evidence that these anomalies are situation specific. That is, psychopaths often display adequate sensitivity to threat and other emotion cues, normal asymmetries, interference in response to incongruent contextual cues, and comparable language skills (see Hare, 1998; Newman & Lorenz, in press, for reviews). We have referred to the situational specificity of the psychopath’s information-processing deficit in the emotion domain as the emotion paradox. To the extent that this paradox and the other situation-specific findings reflect a core feature of psychopathy, understanding the nature of such effects should clarify emotion and processing deficits seen in psychopaths.

We believe that there is increasing evidence that the RMH offers a compelling explanation for such discrepancies. The RMH predicts that psychopaths will perform normally when deliberately attending to relevant task dimensions but appear oblivious to incidental cues that rely on automatic shifts of attention. Consequently, the situational specificity of their information-processing deficits is fundamental to the RMH (Gorenstein & Newman, 1980; Patterson & Newman, 1993). Moreover, as demonstrated in the current study, we believe that the RMH provides a means of integrating psychopaths’ affective anomalies with their anomalous cerebral asymmetries and other information-processing deficits.

Applying the RMH to the emotion paradox, we proposed that psychopaths perform as well as controls when they are deliberately attending to aspects of a situation, but have difficulty processing and integrating information that is incidental to their primary focus of attention. This proposal is consistent with Hare’s (1998) characterization of linguistic processing in psychopaths. Using a combination of evoked potential and imaging data to clarify the processes underlying their lexical decisions, Hare concluded that psychopaths “did little more than make a lexical decision, whereas the nonpsychopaths continued to process and mentally activate or ‘elaborate’ the semantic and affective associations or networks of the word they had just seen” (p. 113). Such characterizations of psychopaths’ processing anomalies suggest that they could resemble nonpsychopaths when they are processing simple information but they are likely to differ from controls on tasks involving more complex or multidimensional information.

In discussing the psychopaths’ difficulties in processing affective and deep semantic information, Hare (1998) proposed that neurobiological basis of these difficulties “may involve anomalies in the integration of activities within and between hemispheres” (p. 124). Moreover, he noted that “as language tasks increased in complexity, nonpsychopaths relied more and more on the left hemisphere to process the information, while psychopaths relied more on the right hemisphere” (p. 125). Assuming that complexity involves processing and integrating multiple sources of information (i.e., response modulation), psychopaths’ response modulation deficits should be most apparent when they are required to process and integrate multiple sources of information using left hemisphere resources primarily. The same analogy suggests that psychopaths would display normal response modulation when using right hemisphere resources primarily.

Returning to the present findings, to the extent that performing blocks of trials with the right hand differentially activates the left hemisphere, psychopaths would be expected to have more difficulty than controls with semantically complex features (e.g., emotionality, frequency) to facilitate lexical decisions in the right-hand condition. Conversely, psychopaths would be expected to use the semantically complex features of words as well as controls on trial blocks performed with the left hand. Thus, the present findings are not only consistent with our hypotheses, but also support recent speculation linking psychopaths’ unusual cerebral asymmetries to their response modulation deficits (Bernstein et al., 2000; Hare, 1998; Hiatt et al., in press; Kosson, 1996, 1998).

One question that arises with regard to this explanation is whether word frequency effects may, like emotion facilitation, be accurately understood as involving semantic complexity? Although researchers are not in complete agreement as to how lexical decisions are performed (Balota, 1994; Balota & Chumbley, 1984; Pugh, Rexer, Peter, & Katz, 1994; Seidenberg & McClelland, 1989), many theorists agree that lexical decisions are performed by serial,
frequency-based searches. Consistent with this view, controls show faster recognition of high-frequency words compared with low-frequency words (Parkin, 1985; Rajaram & Neely, 1992). Given a target stimulus (e.g., assault), other words that share orthographic features with the target are also activated (e.g., assume, vault, etc.). To the extent that the alternative words are higher in frequency than the target, lexical decisions will be slower than if the reverse was true. Restated, the RTs of controls are slower for the low-frequency words than for high-frequency words because their attention is directed automatically to competing words in their mental lexicon (Balota, 1994). When examining RT data, this effect in the controls appears as frequency facilitation to the high-frequency words relative to the low-frequency words. Thus, consistent with the RMH, it follows that the lexical decision of psychopaths are less influenced by word frequency cues than those of controls when they are performing the task with their right, though not their left, hand.

The RMH specifies a possible mechanism for integrating the diverse, and often contradictory, findings that characterize psychopaths’ laboratory performance and clinical symptoms. Given the speculative nature of this integration, however, it is relevant to consider whether existing models, such as Lykken’s (1995) low-fear hypothesis or Fowles’ (1980) weak “behavioral inhibition system” analogy, can account for the current findings. According to Lykken’s low-fear hypothesis, psychopaths’ aberrant performance on experimental tasks should be specific to fearful and, some have argued, negative affect stimuli (Day & Wong, 1996; Lykken, 1957; Patrick et al., 1993, 1994). However, consistent with the a priori predictions, our analyses yielded no significant interactions involving word valence and psychopathy, suggesting that low-anxious psychopaths demonstrated a lack of emotion facilitation to both positive and negative words. Moreover, it is difficult for the low-fear hypothesis or related proposals involving negative affect to explain the fact that low-anxious psychopaths demonstrated performance deficits processing neutral cues (e.g., word frequency). Similarly, the fact that psychopaths’ emotion-processing deficit was specific to trial blocks performed with the right hand is difficult to reconcile with proposals postulating a general insensitivity to threat or negative affect cues.

With regard to Fowles’ (1980) model, the behavioral inhibition system is activated by cues for punishment and novel stimuli. Once activated, the system increases nonspecific arousal, interrupts ongoing behavior, and directs attention toward environmental stimuli (see Gray, 1987). Although much of the evidence supporting the RMH may also be explained with the weak-behavioral-inhibition system hypothesis (see Patterson & Newman, 1993), the current experiment examines the extent to which secondary cues facilitate, rather than interrupt, ongoing behavior. Because the behavioral inhibition system entails interruption or inhibition of behavior in response to secondary cues, explanations invoking this construct cannot easily explain the current findings.

Although the current study made use of well-matched, carefully diagnosed groups and a variety of methodological refinements (e.g., larger sample size, larger word list, less word repetition, alternation of response hand) to improve upon prior research on emotion processing in psychopaths (Williamson et al., 1991), there are potential limitations that require discussion. First, it should be noted that our hypotheses were limited to low-anxious Caucasian male offenders based on a priori, theoretical and empirical justifications. Because the RMH applies to Cleckley’s (1976) characterization of psychopathy, our planned comparisons focused on a subgroup of participants with high PCL–R scores who also meet Cleckley’s exclusion criteria (i.e., absence of psychosis, good intelligence, and low levels of neurotic anxiety). We have elaborated on the rationale for this procedure in numerous publications (Newman & Brinkley, 1997; Newman, Widom, & Nathan, 1985; Schmitt & Newman, 1999a). Moreover, the current study was not designed to test hypotheses about the moderating effects of anxiety. We believe that such tests require more statistical power than was necessary to test the present hypotheses and are most appropriately examined in the context of experimental manipulations designed to reveal such differences. These issues notwithstanding, it is notable that the Psychopathy × Anxiety interactions from the omnibus analyses approached statistical significance for both emotion and frequency facilitation.

Because we neither designed this study to address the effects of anxiety on performance nor tested hypotheses about such differences, we are reluctant to speculate concerning the effects of anxiety on psychopathic and nonpsychopathic offenders. One possibility that may merit future investigation is that response modulation and anxiety both relate to regulation of attention but exert such effects via different mechanisms. Whereas response modulation involves relatively automatic shifts of attention that affect a person’s processing of peripheral cues, the association
between anxiety and avoidance motivation raises the possibility that anxiety motivates the deliberate processing of peripheral cues. Thus, depending on experimental circumstances, high anxiety might be expected to mitigate the consequences of a response modulation deficit.

Furthermore, despite the a priori nature of our planned comparisons and the fact that our lab has routinely focused hypothesis testing on low-anxious Caucasian male offenders, we acknowledge that these selection criteria limit the generalizability of our findings. That is, such findings may not generalize to high-anxious, non-Caucasian, female, or nonoffender samples (see Lorenz & Newman, in press; MacCoon, Lorenz, & Newman, 2001). Although specific, the support for our hypotheses should not be regarded as weak or unreliable. Indeed, the effect size for emotion facilitation (.72) and frequency facilitation (.83) would be considered large (Cohen & Cohen, 1983). Moreover, our use of selection criteria for the purposes of identifying individuals who are relatively homogeneous with regard to the etiological processes of interest (e.g., deficient response modulation) is consistent with recommendations by Gorenstein (1992) and others (e.g., Blashfield, 1984).

Another potential limitation of this study is that each word was presented twice. Multiple presentations of words in a lexical-decision task can engender repetition priming, which may obscure or otherwise obfuscate individual differences in lexical-decision performance. We chose to present each word twice in order to match words presented during the left- and right-hand conditions. That is, each word was responded to once with each hand to ensure that group differences in response hand could not be attributed to the word lists presented during the left- and right-hand conditions. Given that the predicted group differences were specific to right-hand responses for both emotion and frequency facilitation, the observed effects cannot be attributed to repetition priming or to word list effects.

Finally, thus study does not explain how low-anxious psychopaths performed the lexical decisions as quickly and accurately as controls without using multiple aspects of the word stimuli. It is possible that the psychopaths performed the task in a more superficial manner than controls by using dimensions of the word stimuli such as orthographic, phonological, or even semantic features. Though not statistically significant, inspection of Tables 1 and 2 reveals that the low-anxious psychopathic group responded slightly faster and less accurately than the low-anxious controls. Given these data, it may be tempting to propose that the psychopaths’ failure to use emotion and frequency cues reflects the fact that they deliberately processed the words less thoroughly or were not motivated to perform well on the task. However, the fact that psychopaths’ weak facilitation was specific to right-hand trial blocks is difficult to reconcile with a general motivational deficit.

In conclusion, this study highlighted the emotion paradox in psychopathy and provided further evidence for the distinction between appraisal and use of emotional cues that is familiar to emotion theorists (see Clore, 1996; Salovey & Mayer, 1990). We believe that this distinction proves helpful to researchers as they attempt to clarify the psychopaths’ “mask of sanity,” which includes their “unimpaired (sometimes excellent) judgment in appraising theoretical situations” despite their “extraordinarily poor judgment demonstrated in behavior” (Cleckley, 1976, p. 346). Furthermore, working with the assumption that emotional stimuli are secondary cues that influence people’s thoughts and behavior, clinicians may develop cognitive-based interventions to reduce the callousness (i.e., emotional) and self-regulatory (i.e., response modulation) deficits contributing to the antisocial behavior of psychopaths.

References


