RESPONSE MODULATION AND EMOTION PROCESSING: IMPLICATIONS FOR PSYCHOPATHY AND OTHER DYSREGULATORY PSYCHOPATHOLOGY

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Regardless of its specific etiology, most psychopathology involves maladaptive responses to environmental circumstances. Thus, to the extent that a primary function of emotions is to facilitate appropriate responses to environmental circumstances, psychopathology is likely to reflect an emotion processing deficit. Emotion, however, is an exceedingly broad construct that promotes adjustment by coordinating numerous biopsychological systems, spanning motivation, memory, attention, cognition, and learning. Given this broad view, the emotion deficits associated with psychopathology may reflect a similarly diverse array of biopsychological dysfunctions, including difficulty coordinating the various aspects of emotion processing. Rather than review the myriad possibilities regarding emotion processing deficits in psychopathology, we have elected to focus on a specific biopsychological process, response modulation, which we believe is fundamental to emotion processing but which, to date, has been underutilized by emotion theorists and psychopathologists.

More specifically, the purpose of this chapter is to clarify the extent to which deficient response modulation may short-circuit adaptive emotion processing, interfere with self-regulation, and culminate in psychopathology. Toward this end, we (1) briefly review the construct of response modulation, (2) outline a model of emotion processing that highlights the importance of response modulation, and (3) examine the role of response modulation and emotion processing in moderating the self-regulation of behavior. Next, we illustrate the potential importance of response modulation for emotion processing and psychopathology, using psychopathy as a case example. Psychopaths are infamous for their profound emotion and self-regulatory deficits which, we argue, reflect a primary deficit in response modulation. Finally, we broaden our analysis of the relation between response modulation and psychopathology by considering how intense emotion responses may short-circuit adaptive emotion processing and, thus, contribute to the development and maintenance of dysregulatory psychopathology.

Evolution of the Response Modulation Concept

The term response modulation derives from the literature on limbic system dysfunction in animals (e.g., Gray, 1987; McCleary, 1966) and involves suspending a dominant response set (i.e., ongoing approach behavior) in reaction to negative and/or unexpected events (e.g., punishment, frustrative nonreward, contingency reversals, and novel stimuli). Using the literature on limbic system dysfunction as a model, Corenstein and Newman (1980) proposed that deficient response modulation may help to explain the behavior control problems that characterize psychopathy.
and other "syndromes of disinhibition," including attention deficit disorder, early-onset alcoholism, somatization disorder, and impulsivity. Given a deficit in response modulation, individuals are less likely to suspend approach behavior (i.e., pause), evaluate their response strategies (i.e., reflect), and learn from corrective feedback (Newman, 1987).

Subsequent elaborations and extensions of this model have served to broaden its scope and are particularly relevant to this chapter. Based on a series of studies that highlight the information processing consequences of deficient response modulation, Patterson and Newman (1993) translated the response modulation concept into cognitive/attentional terms. According to the revised definition, response modulation involves "temporary suspension of a dominant response set and a brief concurrent shift of attention from the organization and implementation of goal-directed responding to its evaluation" (p. 717). Individuals who show response modulation deficits not only fail to interrupt maladaptive approach behavior but are also less likely to process an array of secondary information or contextual cues that might otherwise influence ongoing, goal-directed behavior (e.g., Newman, Schmitt, & Voss, 1997; Wallace, Vitale, & Newman, 1999).

Research from our laboratory also suggests that there are separate pathways to deficient response modulation (Newman & Wallace, 1993a). Some individuals appear to be characterized by an intrinsic and cross-situation deficiency in response modulation that is manifested whenever they are engaged in the active organization and implementation of goal-directed behavior (see Bernstein, Newman, Wallace, & Luh, 2000; Newman, 1998). However, the response modulation deficits of other individuals occur when emotionally significant cues engender high levels of nonspecific arousal, which, in turn, serve to increase the speed, force, and attentional focus with which dominant responses are implemented (Wallace, Bachorowski, & Newman, 1991; Wallace & Newman, 1997). Regardless of the pathway, individuals with response modulation deficits are inclined to emit dominant responses without adequate consideration of secondary/contextual information. The response modulation deficits of the latter type, however, are relatively specific to circumstances that generate high levels of nonspecific arousal (cf. Easterbrook, 1959).

In summary, response modulation involves suspending a dominant response set to accommodate peripheral or contextual information. Though early research focused on the implications of response modulation deficits for regulating maladaptive approach behavior, more recent investigations have focused on automatic shifts of attention and the way in which deficient response modulation short-circuits the processing of contextual information that would otherwise inform (i.e., provide perspective on) ongoing behavior. This extension, involving the relatively automatic accommodation of contextual cues, supplies a fundamental link between response modulation and emotion processing.

**Emotion Processing: A Context for Interpreting and Responding to Environmental Stimuli**

Given the importance and multidimensional nature of emotion experience, it is not surprising to find diverse views regarding its definition, functions, necessary and sufficient conditions, relation to other biopsychological processes, and regulation (see Ekman & Davidson, 1994). In this section, we discuss our working assumptions about emotion processing for the purposes of clarifying the associations between response modulation and emotion processing.

Specifically, we assume that (1) emotion processing is an associative process that leads to the formation of associative networks; (2) the type and intensity of emotion processing elicited by a stimulus develops with experience; (3) emotion processing involves a cascade of physiological and psychological reactions that exists on a continuum from highly automatic and basic emotions to relatively well-elaborated and complex emotions; (4) the course of emotion processing and resulting associative networks may be altered by cognitive appraisals that affect the array of associations activated and by the use of controlled processing, which allows a person to coordinate more automatic processes; and (5) although emotions generally facilitate quick and relatively automatic responses to environmental stimuli, they may also enhance deliberate decision making and self-regulation (e.g., as when controlled processing of emotional reactions is used to select appropriate interpretations and responses).

Adopting an associational perspective (Bower, 1981; Lang, 1979; Leventhal & Scherer, 1987), we assume that stimuli come to elicit the physiological, attentional, and behavioral responses with which they have been paired. When a person encounters a novel stimulus, the stimulus tends to elicit an orienting response that involves known physiological, attentional, and behavioral consequences (Graham, 1979). Moreover, he or she will typically evaluate the stimulus to determine whether it is positive or negative or merits further investigation. In addition, he or she will likely approach a positive stimulus and withdraw from (or attack) a negative stimulus. When the same or related stimuli are next encountered, his or her associative network will be activated and will automatically "reactivate" these physiological and psychological reactions. In this manner, the associative network provides a context for rapidly interpreting and reacting to internal thoughts and external events.

In the previous example, we noted that the associative
networks, which shape emotion experience, include both physiological and psychological reactions. With regard to the physiological aspect of emotions, Levenson (1994) proposed that "emotions rapidly organize the responses of different biological systems, including facial expression, muscular tonus, voice, autonomic nervous system activity, and endocrine activity to produce a bodily milieu that is optimal for effective response" (p. 123). In addressing the psychological aspect of emotion processing, he observed that emotions alter attention, shift certain behaviors upward in response hierarchies, and activate relevant associative networks in memory. These reactions, in turn, play a major role in shaping a person's response to emotion eliciting situations (Levenson, 1994).

Although some emotion responses may occur in the absence of prior learning, we assume that associative networks develop and evolve as a person experiences diverse physiological and psychological reactions with repeated exposure to a stimulus context. Thus the structure of the associative network varies as a function of the person's learning. For example, riding a roller coaster may initially cause a child to become scared, anxious, and terrified. However, realizing that he or she survived and will not likely die from riding a roller coaster, he or she may experience subsequent roller coaster rides as more exhilarating and exciting. Alternatively, as a friendship evolves from a set of hopeful expectations through the development of trust and affection to extensive interdependence, the associative network activated by the friend will become more extensive and likely grow in affective complexity. Other reactions may not develop in complexity with experience but, instead, grow even more automatic as the person exhibits the same brief and powerfully organized reaction time and again. For example, a spider may routinely elicit a strong negative reaction and behavioral avoidance in a person with a spider phobia. Thus, depending on events and the individual's construal of these events, his or her associative networks and associated emotion responses may develop in a particular direction (e.g., from fear to enjoyment), may become more extensive, differentiated, and complex (e.g., a friendship), or may become increasingly rapid and automatic (e.g., phobic avoidance).

We also assume that the quality of a person's emotion processing plays a fundamental role in determining how experiences are processed and, thus, the evolution and structure of associative networks. In this regard, we find Klaus Scherer's (1982, 1994) stimulus-evaluation-check model to provide a useful framework for conceptualizing how a person's reaction to a stimulus context develops with experience. According to Scherer, emotion acts as an interface, mediating between environmental input and behavioral output. When working well, emotions facilitate the generation and implementation of adaptive responses. These functions are facilitated by a five-stage process of stimulus evaluation. At Stage 1, stimuli are evaluated for novelty and unexpectedness, with consequences for the direction of attention. At Stage 2, the inherent pleasantness-unpleasantness of a stimulus is evaluated, which, in turn, causes a person to experience pleasure or distress. At Stage 3, stimuli are evaluated for their goal relevance, which confers motivational significance to a situation. At Stages 4 and 5, people evaluate the availability of responses for achieving their ends in light of the current circumstances (i.e., degree of control) and consider how their actions, along with their anticipated consequences, relate to social norms and various aspects of self-concept.

From our perspective, Scherer's model serves to clarify the evolving and reciprocal interaction between emotion and cognitive processing. We assume that cognitive appraisals both (1) develop in response to and (2) serve to shape emotion processing in a manner that is substantially the same as other physiological and psychological reactions engendered by potentially significant stimuli. However, because they are more amenable to controlled (i.e., attention-regulated) processing, we believe that cognitive appraisals play a particularly potent role in directing emotion processing. Thus, with increasing stages of cognitive appraisal, emotion processing becomes less automatic (i.e., determined by the stimulus per se), and its associations are increasingly influenced by controlled processing (i.e., directed attention). In other words, a person's emotion experience may be significantly altered by his or her allocation of attention and controlled processing resources.

To this point, we have proposed that emotion processing is determined by the relatively automatic activation of associative networks that develop with experience. Moreover, cognitive appraisals are instrumental in determining the pattern of automatic associations that is elicited by a stimulus and may themselves become relatively automatic. Nevertheless, emotions also play a crucial role in signaling the need for more deliberate information processing. At such times, emotion processing may shift from relatively automatic to controlled processing so that judicious decisions may be made. According to Schneider, Dumas, and Shiffman (1984), automatic processing involves a "fast, parallel, fairly effortless process that is not limited by short-term memory (STM) capacity, is not under direct subject control, and is responsible for the performance of well-developed skilled behaviors" (p. 1). This type of process is "activated automatically without the necessity of active control or attention by the subject" (Schneider & Shiffman, 1977, p. 2). By contrast, controlled information processing involves "a slow, generally serial, effortful, capacity-limited, subject-regulated processing mode that must be used to deal with novel or inconsistent information" (Schneider et al., 1984, p. 2). With controlled proc-
essing, an individual can deliberately focus on a particular set of associations and use attention to guide emotion processing.

An example of this transition might involve the consequences of tasting a novel but ultimately disgusting food at a dinner party. The fundamental and relatively automatic response would involve spitting out the disgusting substance. This reaction requires little or no controlled processing. However, because the stimulus is encountered in the context of a dinner party, one's automatic reaction is likely to be evaluated and replaced by a more socially acceptable reaction. The reason is that the social context will have primed (i.e., automatically activated) a set of acceptable and unacceptable behaviors that will, under most circumstances, influence a person's reaction. The force of such influences is likely to reflect equally automatic emotion responses, which accrue as a person anticipates the reactions of other guests to his or her behavior. In the end, one's conflicting urges to spit and to avoid potential embarrassment might prime thoughts about privacy and rest rooms, which, in turn, might attract controlled processing and yield an acceptable solution to the problem. This example illustrates how adaptive emotion processing often involves shifting attention among multiple automatic associations and then allocating controlled processing resources to particular associations for the purposes of identifying adaptive responses.

The preceding characterization of emotion processing as facilitating deliberate responding may appear paradoxical. As noted by Scherer (1994), it seems paradoxical to propose that emotions engender a pause and time to reflect before acting, because strong emotions typically result in rapid action. After proposing that emotion is also a “relevance detector” that may be expected to reflect the importance or urgency of an event, Scherer concluded that “the inverse relationship between the intensity of an emotion and the length of the latency time is actually one of the most powerful design features of the emotion mechanism” (p. 129). When intensity is very high, as in emergency situations, “the organism cannot afford the luxury of repeated evaluations” and thus reverts to the “wisdom of the body” (p. 129). Similarly, Levenson (1994) described “short-circuiting cognitive processing” as a primary function of emotion. “In situations where hesitation could have the most dire consequences, emotion functions to set aside cognitive processing that is too cumbersome, too obsessive, too self-indulgent, and ultimately, too likely to be inconclusive” (p. 124).

To function adaptively in mediating between environmental input and behavioral output, emotions need to vary widely in time course and complexity to accommodate the extraordinary range of environment-behavior interactions that require mediation. Emotion reactions subserve split-second reactions, as well as momentous decisions. When necessary, people can respond to a stimulus based on its apparent valence in a reflexive or highly automatized manner. However, given time, people are inclined to consider more aspects of a stimulus context, engage in more levels of analysis, and consider a wider range of potential responses. Though the more reflective response has the obvious advantages of employing higher level cognitive processing, critical evaluation, and response choice, many situations require more rapid action. By this reckoning, the function of emotion is best served by reactions that match the nature of an eliciting stimulus.

In this regard, Scherer (1994) has proposed that emotions serve to “decouple stimulus and response” and may “interpose a response latency between stimulus and response.” This decoupling allows for a high degree of flexibility in responding to diverse situations. Although it may be bypassed in emergency situations, “the latency time can be used to analyze and evaluate the stimulus event as well as one’s repertoire of reactions or coping alternatives more thoroughly. On the basis of this additional information, the response can be modified appropriately” (p. 128). Thus adaptive responding often involves making use of this capacity in order to pause and reflect on one's cognitive and affective associations.

The Association Between Response Modulation and Emotion Processing

The preceding discussion of response latency and pausing to evaluate one's responses clarifies the fundamental association between response modulation and emotion processing. The process of response modulation involves the automatic redirection of attention and facilitates the shift from automatic to controlled processing (see Wallace, Schmitt, Vitale, & Newman, 2000). Despite its rudimentary nature, involving a brief and relatively automatic shift of attention, response modulation enables individuals to (1) use their active attention to consider diverse aspects of a stimulus array, including associations derived from past experience, and (2) use their controlled processing resources to elaborate, evaluate, and utilize contextual information, thus improving the quality of their stimulus analysis and behavioral responses. Referring to the orienting response concept employed by psychophysicists (e.g., Graham, 1979), Patterson and Newman (1993) noted that certain stimuli elicit an “automatic call for processing” and that the response modulation variable refers to a person's tendency and/or ability “to answer the call.” To the extent that individuals answer the call for processing (i.e., switch their focus of attention), they are able to analyze the meaning of a stimulus and purposely use that information to improve the quality of their responses. In the absence of response modulation, people are less able
to shift attention and thus to utilize contextual cues, past experience, and controlled processing resources to refine responding. According to our view that emotion processing requires the use of contextual information (i.e., associative networks), a deficit in response modulation would dramatically diminish the quality of emotion processing.

Response Modulation, Emotion Processing, and Psychopathology

Our goal in this section is to clarify how individual differences in response modulation and emotion processing contribute to the development and maintenance of psychopathology. Toward this end, we discuss the importance of response modulation and emotion processing for regulating one’s behavioral and affective responses. Individuals may be at high risk for developing psychopathology due to a variety of biological, psychological, and social factors. However, people are also equipped with a remarkable capacity for coping, problem solving, and adjustment. Thus people should be able to identify problematic responses, analyze them, and generate solutions. In other words, people can use controlled processing to check and revise maladaptive thinking and behavior. Given the capacity to correct problematic behavior, the existence of persistent psychopathology suggests a failure of self-regulation.

According to Kanfer and Gaelick (1986), self-regulation involves the deliberate monitoring, evaluating, and, if needed, correction of behavioral responses. By definition, self-regulation is mediated by controlled processing (Kanfer & Gaelick, 1986). The literature on self-regulation is concerned primarily with using self-regulation to treat maladaptive behaviors within a therapeutic context. The goal of such interventions is to “deautomatize” maladaptive behaviors and “reautomatize” more adaptive ones. Regardless of the factors that produced the psychopathology, the expectation is that people can learn to alter maladaptive reactions by evaluating and replacing them. Similar formulations have been proposed for cognitive and emotion regulation (Beck, 1976; Ellis & Harper, 1975; Gross & Munoz, 1995).

In spite of the sizable literature on self-regulation as a therapeutic technique, researchers have rarely considered the implications of self-regulation for the development and maintenance of psychopathology. Nevertheless, the self-regulation model provides a compelling perspective on psychopathology that, moreover, serves to clarify the contribution of deficient response modulation and emotion processing to psychopathology. Although it is natural to focus on the controlled processing resources that mediate self-regulation, the shift to controlled processing and self-regulation is typically initiated by emotion cues and requires response modulation (Newman, 1998).

Although we recognize that it is possible for self-regulation to be initiated deliberately, as it is in the therapeutic context, we believe that such behavior is relatively uncommon. Examples of deliberately initiated self-regulation would include monitoring one’s smoking for the purpose of altering a bad habit or monitoring one’s verbal behavior to make a good impression during a job interview. More commonly, however, self-regulation is initiated in response to motivationally or emotionally significant stimuli, which generate an automatic call for processing by virtue of their significance. For example, in response to a parent’s glare, an unanticipated disappointment, or even a surprising compliment, an automatic call for processing is likely to initiate self-regulatory processing. Thus the initiation of self-regulation will typically depend on relatively automatic shifts of attention, and failures of self-regulation will often reflect situation-specific deficits in shifting attention to utilize such peripheral cues (i.e., response modulation).

In our view, response modulation, emotion processing, and self-regulation are closely related processes which, when combined, constitute a highly effective system for interacting with the environment. When operating effectively, the system reacts to potentially significant events by interrupting ongoing processing and redirecting attention to potentially relevant stimuli in the environment and/or to potentially relevant details of their primed associations. Depending on the products (i.e., results) of this automatic processing, certain cues may come to command controlled processing and thus allow a person to coordinate affective and cognitive processing to achieve effective self-regulation.

A deficit in response modulation would significantly alter the automatic and controlled processing of motivationally significant events and hamper self-regulatory processing. Under such circumstances, people would consider fewer aspects of a situation and would respond based on the unchecked affective, cognitive, and behavioral products of automatic processing. Many psychologists have written about the importance of using controlled processing resources to “check” and, if necessary, correct the products of automatic processing (e.g., Gilbert, 1989). Although a person’s automatic responses are typically appropriate, it is essential to regulate one’s behavior when circumstances elicit maladaptive automatic responses (Hollon & Garber, 1990). In the absence of effective self-regulation, maladaptive reactions continue and, with repetition, may become highly automatic. Depending on the severity of the problem behavior and subsequent efforts to alter it, such reactions may culminate in a diagnosis of psychopathology.

For instance, after disciplining a child and observing the child’s emotional distress, a father may recognize that his style of parenting has become overly harsh and potentially destructive. With such awareness, this father may...
deliberately engage in self-regulation during subsequent interactions with his child so that the unacceptable behavior is “deautomatized” and replaced with a more appropriate response. Unfortunately, a deficit in response modulation tends to interfere with the ability to recognize problems (i.e., emotion processing), as well as with subsequent efforts to monitor, evaluate, and correct the behavior (i.e., self-regulation). Thus, in addition to increasing a person’s risk for developing unchecked, maladaptive responses, deficient response modulation contributes to the maintenance of psychopathology by hampering the controlled evaluation and correction of maladaptive habits.

To this point, we have emphasized the fact that a deficit in response modulation may short-circuit emotion processing, but the relationship between response modulation and emotion processing appears to be reciprocal. Just as deficient response modulation may curtail emotion processing, an unusually intense emotion response may preclude effective response modulation. That is, in a manner analogous to the “short-circuiting” of emotion processing described by Levenson (1994), we have proposed that intense emotions create a sense of urgency (i.e., arousal) which, in turn, leads a person to focus narrowly on specific, emotion-related cues and/or products of automatic processing (Wallace et al., 1991). This intense focus, in turn, hampers response modulation and, by extension, results in the relatively automatic expression of unchecked behavior patterns (i.e., a breakdown in self-regulation; Wallace & Newman, 1997). For example, if a father’s anger is sufficiently intense, he may lack the ability to pause and consider other interpretations of or reactions to his child’s behavior (see Berkowitz, 1993).

To the extent that we regard deficient self-regulation as a proximal and sufficient cause of psychopathology, this analysis suggests two major pathways to the development and maintenance of psychopathology. The first concerns a general deficiency in response modulation that curtails emotion processing and hampers self-regulation. The second involves an emotion-mediated disruption of response modulation that precludes adaptive self-regulation in response to situations that have acquired intense emotional significance. In the following sections, we review research on psychopathic and emotionally reactive individuals, respectively, to elucidate these pathways.

Pathway 1: The Emotion Processing Deficits of Psychopathic Individuals

A wealth of clinical and laboratory evidence attests to the deficient emotion processing of psychopathic individuals. In this section, we review evidence demonstrating that psychopaths’ emotion processing deficits may be explained by a deficiency in response modulation. Moreover, we argue that deficient response modulation provides a more comprehensive explanation of the existing evidence than alternative explanations that involve a diminished capacity for fear or negative affect.

Clinical Descriptions of Psychopathic Behavior

In his classic book, *The Mask of Sanity*, Hervey Cleckley (1976) used his extensive clinical experience and acumen to set out the construct of psychopathy. Cleckley viewed psychopathy as a profound failure of adjustment that could not be attributed to inadequate intelligence, psychotic-like thought disorder, or excessive neurotic anxiety. In contrast to the American Psychiatric Association’s (1994) diagnosis of antisocial personality disorder, which identifies a rigid and maladaptive antisocial adjustment, Cleckley’s syndrome highlights dysfunctional psychological processes such as “poverty in major affective reactions,” “poor judgement and failure to learn by experience,” “pathologic egoentricity,” and “failure to follow any life plan” (p. 224). Cleckley described psychopathic individuals as lacking the essential capacity for maintaining normal adjustment rather than being driven to antisocial behavior.

Concerning psychopaths’ emotion deficits, Cleckley (1976) wrote: “My concept of the psychopath’s functioning postulates a selective defect or elimination which prevents important components of normal experience from being integrated into the whole human reaction, particularly an elimination or attenuation of those strong affective components that ordinarily arise in major personal and social issues” (p. 374). Though he emphasized emotion deficits in his description of the syndrome, Cleckley also highlighted an emotion paradox (see Lorenz & Newman, 2001). He wrote: “All judgments of value and emotional appraisals are sane and appropriate when the psychopath is tested in verbal examinations” (p. 369) and that “only when the subject sets out to conduct his life can we get evidence of how little his good theoretical understanding means to him. . . . What we take as evidence of his sanity will not significantly or consistently influence his behavior” (p. 385).

Given his emphasis on emotion deficits, it is noteworthy that Cleckley’s characterization of psychopaths’ core dysfunction posits a more general defect in semantic processing that prevents them from appreciating the meaning of their actions. “In attempting to account for the abnormal behavior observed in the psychopath, we have found useful the hypothesis that he has a serious and subtle abnormality or defect at deep levels disturbing the integration and normal appreciation of experience and resulting in a pathology that might, in analogy with Henry Head’s classification of the aphasias, be described as semantic” (p. 388). Also highlighting a more general, integrative deficit that hampers their judgment and affective processing,
Shapiro (1965) proposed that psychopaths do not lack pertinent information or knowledge, "but rather the active, searching attention and organizing process that normally puts such information to use" (p. 149). This failure to consider the ramifications of one's behavior was amusingly portrayed by an escaped convict who was using a charity scheme to support himself until he made an appearance on national television to promote his cause (Hare, 1970). Such clinical observations regarding the psychopath's failure to integrate a variety of important information are at least as consistent with a deficit in response modulation as they are with an incapacity for affective experience.

**Laboratory Evidence**

Next, we review evidence from four domains of psychopathy research: passive avoidance learning, emotion facilitation of lexical decisions, psychophysiological reactivity to emotion stimuli, and affect-mediated startle modulation. In addition to demonstrating emotion deficits, the results suggest that psychopaths' deficiency in emotion processing is (1) restricted to the relatively automatic, as opposed to deliberate, use of contextual emotion cues and (2) matched by comparable problems in the relatively automatic processing of affectively neutral contextual cues. The purpose of this review is to demonstrate that the psychopath's emotion processing deficits may be accurately and usefully understood as a consequence of deficient response modulation and thus to demonstrate that response modulation may play a crucial role in mediating emotion processing.

**Passive Avoidance: Using Emotion Cues to Inhibit Punished Responses**

In what is arguably the most influential study on psychopathy, Lykken (1957) examined the extent to which psychopaths' putative fear deficit would interfere with learning to inhibit punished responses (i.e., passive avoidance learning). Participants were instructed to learn a sequence of responses to work their way through a mental maze. Superimposed on this primary task was a "latent" shock contingency that involved learning to inhibit particular responses at each step of the maze. Although participants were obviously aware that shock electrodes had been attached, they were apparently provided with a cover story rather than with explicit instructions concerning the punishment contingency. Lykken (1995) stated that the rationale for this deception was that if the contingency had been explicit, participants would have been motivated by external factors to master the contingency. By contrast, learning a latent contingency would likely reflect intrinsic motivation. As predicted, psychopaths demonstrated little to no learning of the passive avoidance contingency and made significantly more shocked errors than controls.

Lykken's (1957) findings (see also Schmauk, 1970) are typically interpreted as evidence that psychopaths are characterized by a fundamental emotion deficit (i.e., lack of fear) that undermines passive avoidance learning (e.g., Lykken, 1995). However, an equally plausible interpretation is that psychopaths have difficulty learning latent contingencies which, by definition, are peripheral to participants' primary task and focus of attention. If, as predicted by the response modulation hypothesis, psychopaths are less likely to shift attention from a primary task to process peripheral cues, then their poor learning of the latent avoidance contingency may reflect attentional, as opposed to purely emotional, limitations.

To the extent that deficient response modulation is primarily responsible for psychopaths' passive avoidance deficits, their avoidance deficits should be specific to conditions involving relatively automatic shifts of attention and should disappear if the avoidance contingency becomes the focus of primary attention. To test this hypothesis, Newman and Kosson (1986) assessed passive avoidance learning under two sets of experimental conditions. Both conditions featured 10 blocks of trials that involved the consecutive presentation of 8 two-digit numbers on a computer monitor. Participants were instructed to learn, by trial and error, which numbers required them to respond and which required response inhibition (see Figure 49.1).

In the first condition, participants earned monetary rewards for responding to a set of arbitrarily designated "good numbers" and lost money for responding to "bad numbers." The second (punishment-only) condition involved the same discrimination task, but participants lost money if they failed to respond to good numbers, as well as for responding to bad numbers. Even though the passive avoidance contingency was identical in both conditions,

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Figure 49.1 Representation of the response contingencies for the reward-punishment and punishment-only conditions of the passive avoidance task used by Newman and Kosson (1986).
it was less salient and thus more dependent on response modulation in the former, the reward-punishment, condition than in the latter, the punishment-only, condition. Whereas participants focus initially on responding for reward and then shift attention to process punishment feedback in the reward-punishment condition, avoiding punishment is participants' primary focus of attention from the outset of the punishment-only condition. As predicted, psychopaths exhibited a passive avoidance deficit in the reward-punishment condition, but they performed at least as well as controls when avoiding punishment was their only task (i.e., their dominant response set; see figure 49.2).

Inadequate attention to latent avoidance contingencies also provides a compelling explanation for psychopaths' insensitivity to punishment, and consequent self-regulatory deficits, in laboratory gambling tasks. In 1976, Siegel demonstrated that psychopaths persist in "betting" on playing cards even when the probability of losing exceeds that of winning. After playing a deck of 40 cards involving 100% reward, participants were allowed to play as many cards as they wished from nine other decks that ranged from 0% to 90% reward with a complementary percentage of punishment. Although floor and ceiling effects appeared to prevent group differences from reaching statistical significance at the extreme percentages, psychopaths played more cards than controls on all decks. Although their performance suggested that psychopaths were less acute in perceiving the diverse probabilities of rewards and punishments, a direct test of this possibility indicated otherwise. During play with the 30% and 70% decks, Siegel interrupted his participants and asked them to estimate the likelihood that the next card would be a winner. Psychopaths and controls were equally adept at judging the probabilities under these circumstances.

Following Siegel (1978), Newman, Patterson, and Kossen (1987) developed a computerized card-playing task with one deck of 100 cards. Participants won 5 cents for playing a face card (jack, queen, king, or ace) and lost 5 cents for playing a number card. The probability of reward was 90% for the first block of 10 cards, 80% for the second block of cards, 70% for the third block of cards, and so on until the last block of cards, which were all losers. Thus the probability of punishment increased from 10% to 100% as the task progressed. Participants were told that they could not "pass" cards but that they could quit the game whenever they wanted to by pressing a second button. The dependent measure was the number of cards played before quitting the game. As predicted, psychopaths played significantly more cards and lost significantly more money than controls (see also Fisher & Blair, 1998; O'Brien, Frick, & Lyman, 1994; Shapiro, Quay, Hogan, & Schwartz, 1988; see Figure 49.3).

Our interpretation of these findings is that the psychopaths' deficiency in response modulation interfered with their ability to monitor, evaluate, and alter their maladaptive response strategy (i.e., self-regulation). To evaluate this interpretation, another condition was employed that forced participants to wait for 5 seconds, while a cumulative record of their response feedback was displayed, be-

![Card Playing Task](image-url)
before allowing them to play the next card. The purpose of this manipulation was to obviate the need for response modulation by forcing participants to stop and reflect on the changing contingencies. Under these conditions, psychopaths and controls played the same number of cards and earned comparable amounts of money. Given access to the same information, psychopaths and controls appeared to weigh the information similarly and make the same decisions.

To this point, the evidence suggests that psychopaths’ deficiencies in using punishment cues to facilitate self-regulation is specific to conditions that require response modulation, but the studies cited here did not directly measure the association between response modulation and passive avoidance. Toward this end, Newman, Patterson, Howland, and Nichols (1990)* modified the reward-punishment version of the passive avoidance task used by Newman and Kosson (1986; see Figure 49.1) to provide an estimate of response modulation. Specifically, whenever a participant responded to a stimulus number, the computer display, including the stimulus number and response feedback, remained on until participants gave responses that advanced them to the next trial. By comparing response times following punishment to response times following reward, it was possible to estimate the extent to which participants paused or suspended a dominant response set for reward to process negative feedback. Consistent with predictions, psychopaths paused approximately half as long as controls following negative feedback, and, across groups, pausing predicted participants’ ability to use punishment cues to inhibit punished responses (see Figures 49.4, 49.5, 49.6). Thus the results of this study lend credence to our proposal that deficient response modulation hampers the psychopath’s use of punishment cues to regulate ongoing, goal-directed behavior.

![Figure 49.5](image1)
Figure 49.5 Amount of time (in msec) that low-anxious psychopaths and controls paused following presentation of correct (i.e., after reward) and incorrect (i.e., after punishment) response feedback in the passive avoidance task. From Newman, Patterson, Howland, and Nichols (1990), copyright 1990, with permission from Elsevier Science.

![Figure 49.6](image2)
Figure 49.6 Relation between pausing (i.e., reflectivity) after punishment feedback and learning (i.e., passive avoidance errors). Each block dot represents one participant. The partial correlation refers to the association between pausing and learning after removing the variance associated with pausing after reward and provides a better estimate of response modulation. Data are from Newman, Patterson, Howland, and Nichols (1990).
We have proposed that the poor passive avoidance learning of psychopathic individuals reflects a fundamental deficiency in response modulation as opposed to a primary deficit in capacity for negative affect. If we are correct, then psychopaths should display deficits in processing affectively neutral contextual cues, as well as contextual emotion cues. To examine this prediction, we conducted a series of experiments using variations of the traditional Stroop paradigm. In one task, participants were instructed to press a button as quickly as possible to indicate whether two successively presented words (or pictures) on a computer screen were conceptually related or not. The first word (or picture) always appeared in conjunction with a picture (or word) that participants were instructed to ignore. Consistent with previous research (e.g., Gernsbacher & Faust, 1991), nonpsychopathic controls responded significantly more slowly when the to-be-ignored stimulus conflicted with their primary task. However, as shown in Figure 49.7, psychopaths were essentially unaffected by the incongruent contextual information (Newman, Schmitt, & Voss, 1997). These findings have been replicated using a noncomputerized picture-word Stroop task and another computerized task that required participants to name the color of rectangles containing incongruent color names (Schmitt & Newman, 2000). In each case, psychopaths were unaffected by incongruent contextual cues, which automatically interfered with the primary task performance of controls.

These findings demonstrate that psychopaths are characterized by an "insensitvity" to affectively neutral cues that parallels their insensitivity to emotion cues and provide empirical support for Shapiro's (1965) speculation that the cognition of psychopathic individuals "is characterized by an insufficiency of integrative processes that is comparable to the insufficiency of integrative processes on the affective side" (p. 299). Although a deficit in response modulation can account for psychopaths' insensitvity to both types of contextual information, it is difficult to understand why psychopaths would be insensitive to affectively neutral cues if their core deficit is emotional. Thus these laboratory findings further suggest that the emotion deficits seen in psychopaths may reflect a more general information processing deficiency (Cleckley, 1976; Newman, 1998).

Using Emotion Cues to Facilitate Word Recognition

Many researchers have assessed emotion processing in the context of passive avoidance learning because of its association with poorly regulated, antisocial behavior. To assess emotion utilization more directly, however, other investigators have examined psychopaths' ability to utilize emotion cues while performing a lexical decision task. In a lexical decision task, participants are instructed to identify strings of letters, as quickly and accurately as possible, as words or nonwords. Based on previous research demonstrating that emotion-related words are identified as words more quickly than affectively neutral words, Williamson, Harpur, and Hare (1991) predicted and found that psychopaths were significantly less affected by the affective quality of words than were controls (see also Day & Wong, 1996). We recently replicated and extended these results using a larger sample and several methodological refinements (Lorenz & Newman, 2001).

Psychopaths' deficits in emotion facilitation on the lexical decision task are especially relevant to the current discussion because the task is thought to measure the relatively automatic influence of associative processing. Whereas emotional cues appear to activate associative networks that aid performance in controls, such cues have little effect on the performance of psychopaths. This powerful evidence of deficient utilization of emotion in psychopaths provides another opportunity to ask whether their deficit reflects an attentional or purely emotional problem. To evaluate this question, Lorenz and Newman (2001) examined the extent to which affectively neutral contextual cues influenced the lexical decisions of both psychopaths and controls. Specifically, using the same task that had demonstrated group differences in emotion facilitation, we compared the extent to which high (versus low) word frequency facilitated participants' lexical decisions. Although the mechanisms that underlie such effects are not well understood, research shows that high-frequency words are identified more quickly than low-frequency words (Rajaram & Neely, 1992). Consistent with this finding, nonpsychopathic controls demonstrated significant frequency facilitation, as well as emotion facilitation. However, paralleling our results for emotion facilitation, differences in word frequency had significantly less effect on the lexical decisions of psychopaths relative to controls (see Figure 49.8). In light of the fact that high-
and low-frequency words were matched on emotionality (i.e., arousal and valence), as well as other important characteristics, such findings suggest that psychopaths are deficient in both semantic and emotion processing (see also Hare, 1998). The lexical decision results are, therefore, consistent with our proposal that psychopaths are less likely to utilize the same associations that automatically influence the behavior of nonpsychopaths.

In addition to performing the lexical decision task, Williamson et al. (1991) asked their participants to appraise the affective valence of the words employed in their study. In contrast to their performance on the lexical decision task, the affective appraisals of psychopaths and controls were indistinguishable. This discrepancy between appraising and utilizing emotion cues was also replicated by Lorenz and Newman (2001), and similar findings have been reported by Petruck, Brailley, and Lang (1993) and by Blair (1999). Such findings show that psychopaths perform as well as controls when their primary task is evaluating affective stimuli (i.e., when the task depends on deliberate attention as opposed to response modulation).

Results from the lexical decision experiments complement previous behavioral evidence in demonstrating that psychopaths' inefficient use of emotion cues reflects a problem with attention rather than an emotion-specific deficit. When emotion processing involves deliberate attention, as it does in the word rating task and the punishment-only condition of the passive avoidance task, psychopaths perform as well as controls. However, when emotion processing depends on relatively automatic shifts of attention from a deliberate focus (i.e., primary task) to other, less salient, aspects of a stimulus array or associative network, then psychopaths are deficient. Moreover, the reduced accessibility of such primed associations in psychopaths is not restricted to fear, negative affect, or even positive affect cues. Indeed, there is now considerable evidence that this processing anomaly extends to affectively neutral contextual cues. Deficient response modulation provides a relatively parsimonious explanation for all of these findings.

Psychophysiological Responses to Emotion Stimuli

Further evidence for an emotion deficit comes from research using electrodermal activity (EDA) to assess emotion processing in psychopaths. These EDA studies have provided good support for the hypothesis that psychopaths display less anticipatory and conditioned arousal to threat cues than do controls (see Arnett, 1997; Fowles & Missel, 1994, Hare, 1978). For example, Hare (1965) examined EDA while participants watched numbers count up from 1 to 10. Participants were informed that they would receive a strong electric shock each time the number 8 appeared. Relative to nonpsychopathic controls, psychopaths displayed smaller electrodermal responses, and their increases in EDA occurred in close proximity to the shock (i.e., to the number 7 rather than earlier numbers), indicating weaker anticipatory conditioning (see also Ogloff & Wong, 1990). More recently, Patrick, Cutibert, and Lang (1994) demonstrated that psychopaths displayed less EDA than controls in response to tones that had been associated with fear images (e.g., “Taking a shower, alone in the house, I hear the sound of someone forcing the door, and I panic”).

Because such findings are well replicated, they are generally regarded as providing strong and differential support for the low-fear hypothesis (e.g., Lykken, 1995). Although we recognize the merits of this view, we believe that there are important limitations in the evidence that preclude such strong conclusions. First, with few exceptions, investigators have failed to include appropriate control conditions. Without comparing participants’ EDA to fear cues with their EDA to other, equally potent emotion cues, it is impossible to know whether psychopaths' deficient EDA reflects fear conditioning or some other process. In one of the few studies to include a positive affect control condition, Hare and Quinn (1971) found similarly deficient conditioning among psychopaths regardless of whether slides of nude females or electric shocks were the unconditioned stimuli. Although this difference failed to reach statistical significance in the positive condition, inspection of the data indicates that psychopaths were similarly hyporeactive to the stimuli paired with shocks and with nude females. That is, the difference in statistical significance appears to reflect the fact that controls reacted much more strongly to the stimuli associated with electric shocks. Despite consistent evidence regarding poor fear conditioning in psychopaths, it is not yet possible to eval-
uate whether this deficit reflects lack of capacity to experience fear or a more general deficit that impairs EDA conditioning.

A second reason to be cautious when interpreting the EDA findings is that psychopaths and controls typically display comparable emotional (EDA) responses when instructed to attend to emotion slides. For example, Patrick, Bradley, and Lang (1993) instructed participants to "view each slide for the entire time it appeared on the screen" (p. 85) and found comparable EDA and subjective ratings to both positive and negative emotional slides in psychopaths and in controls. Using the same procedure, Levenston, Patrick, Bradley, and Lang (2000) obtained the same result. Blair, Jones, Clark, & Smith (1997) compared the EDA of psychopaths and controls as they viewed threat, distress, and neutral slides and failed to find significant group differences in response to the threat slides. Because these studies all reported significant main effects, with participants displaying larger psychophysiological reactions to the affective slides than to the neutral slides, the lack of group differences in EDA is unlikely to reflect weak or inadequate emotional stimuli. In fact, both psychopaths and controls displayed significant increases in EDA to the negative slide stimuli. As the only exception to this pattern of results, psychopaths displayed significantly less EDA to the distress slides (e.g., crying child) than controls did, despite showing a significant increment in EDA relative to baseline (Blair et al., 1997). Paralleling the behavioral data, then, psychopaths and controls appear to display comparable EDA when their task involves deliberately attending to affective stimuli.

To our knowledge, the only study to evaluate EDA while manipulating psychopaths’ dominant response set was conducted by Arnett, Smith, and Newman (1997). The study employed a continuous motor task in which one of five peripheral green lights was lit each time a participant pressed the center button. Participants were instructed to press the button corresponding to the peripheral green light as quickly as possible and then to press the center button again. In one (i.e., reward-punishment) condition, participants earned 5 cents each time they completed five presses within the allotted time. In the other (i.e., punishment-only) condition, rapid responding enabled participants to avoid losing 5 cents. After performing the task for 1 minute, a central red light was activated to indicate that the peripheral green lights could change from green to red between the time participants released the center button and pressed the peripheral button. If participants pressed the peripheral button in the presence of a peripheral red light, they lost 50 cents. This phase also lasted 1 minute, and the two phases were repeated four times.

In both conditions, then, the center red light indicated that task contingencies were changing and that participants would now have to inhibit specific responses to avoid relatively large monetary punishments. When this passive avoidance contingency was superimposed on a response set for reward, there was a significant main effect, with psychopaths displaying less EDA than controls to the salient punishment cues. However, when the same contingency was superimposed on the active avoidance (i.e., punishment-only condition) task, which already involved a focus on avoiding money, psychopaths’ EDA increased as much as controls. Thus, paralleling the behavioral evidence, these results demonstrate that group differences in EDA appear to depend on participants’ dominant response set. When psychopaths are instructed to attend to slides or are provided with punishment cues that are consistent with their dominant response set (i.e., avoiding punishment), their EDA appears comparable to that of controls.

A third limitation of the EDA evidence that precludes strong conclusions is that, with rare exceptions, investigations of EDA in psychopathic and nonpsychopathic participants have failed to control for trait anxiety (see Arnett, 1997). Examination of anxiety is important because it has been found to moderate (i.e., interact with) psychopathy in determining both behavioral and psychophysiological responses to threat cues. For example, after using a pre-treatment manipulation to establish the letter Q as a cue for punishment, Newman, Wallace, Schmitt, and Arnett (1997) examined the extent to which presentation of this cue slowed responses to target letters during a subsequent block of trials. Even though the cue no longer predicted punishment, participants with high anxiety responded to targets more slowly on cue-present trials than on cue-absent trials than did low-anxious controls. When the task was administered to criminal offenders, the researchers obtained a significant main effect for psychopathy and a psychopathy-by-anxiety interaction. Consistent with a low-fear interpretation, controls displayed more response inhibition to the peripheral punishment cues than psychopaths did. However, this main effect was qualified by a significant interaction that indicated that the effect was specific to the high-anxious psychopaths and controls. Whereas high-anxious controls resembled high-anxious students in displaying increased response inhibition to the cues, high-anxious psychopaths responded more quickly in the presence of punishment cues. In contrast, the punishment cues had minimal impact on low-anxious participants regardless of psychopathy status. Such findings suggest that sensitivity to threat cues relates primarily to trait anxiety and that the contribution of psychopathy reflects some other process, perhaps attention related, that moderates the quality of an individual’s response to threat cues.

The results of the Arnett et al. (1997) investigation described here demonstrate that psychopathy and anxiety may also interact to determine EDA in response to threat cues. Recall that this study assessed EDA in response to a
central red light that signaled that participants might have
to inhibit approach responses (or active avoidance re-
sponses in the punishment condition) to avoid relatively
large (i.e., 50-cent) punishments. As already noted, the
groups did not differ in the punishment-only condition,
but there was a significant main effect for psychopathy in
the reward-punishment condition. Furthermore, this main
effect was qualified by a significant psychopathy-by-
anxiety interaction. As shown in Figure 49.9, both the
main effect and interaction were carried by the strong re-
action of high-anxious nonpsychopaths. Whereas low-
anxious psychopaths and controls displayed comparable
skin conductance responses to the red lights, high-anxious
controls displayed significantly greater skin conductance
responses than high-anxious psychopaths.

The association between psychopathy and EDA in re-
sponse to threat and other emotional cues is generally re-
garded as the most widely replicated and important find-
ing in the field (Lykken, 1995). Moreover, such findings
are the cornerstone of proposals that postulate that a fun-
damental emotion (i.e., fear) deficit underlies the syn-
drome of psychopathy. Although the poor-fear-
conditioning finding is well replicated, it seems clear that
there are inconsistencies and unresolved issues that need
to be addressed before we can draw firm conclusions. If
psychopaths lack the capacity for fear and negative affect,
why do they display normal EDA while viewing emo-
tional pictures (e.g., Patrick et al., 1993) and in response
to informative punishment stimuli while working to avoid
punishment (e.g., Arnett et al., 1997)? Furthermore, in the
absence of evidence that psychopaths’ weak EDA is spe-
cific to conditioned threat cues (i.e., that it does not apply
to appetitive stimuli), there is little reason to attribute
such findings to a diminished capacity for fear or negative
affect as opposed to other factors that mediate conditioned
electrodermal responses. Finally, the fact that psychopa-
thy and anxiety interact to determine EDA in response to
threat cues suggests that EDA reflects diverse psychologi-
ical processes and that sensitivity to threat cues is not the
only explanation for such evidence.

We have proposed that psychopathy is associated with
an attentional (i.e., response modulation) deficit that im-
pairs emotion processing. We believe that this explanation
is no less consistent with the EDA evidence than is the
low-fear hypothesis. Psychopaths display normal emo-
tional responses when they are instructed to attend to
emotion stimuli (e.g., pictures) and when emotion stimuli
are relevant to their dominant response set (e.g., avoiding
punishment). Conversely, they display emotion deficits
(i.e., less EDA) when processing emotion stimuli that rely
on the automatic activation of associative networks (i.e.,
conditioned stimuli). Moreover, an attentional explana-
tion involving the automatic activation of associative networks
would apply to positive, as well as aversive, conditioned
stimuli and might clarify the meaning of the observed
psychopathy-by-anxiety interactions. For instance, a per-
son’s level of anxiety may influence the meaning of threat
cues, whereas his or her level of psychopathy may influ-
ence the degree to which the meaning is processed.

Although this characterization of the EDA evidence is
generally consistent with the response modulation hy-
pothesis, the requirement to shift attention is not manip-
ulated and thus is not explicit in all paradigms that reveal
group differences in EDA. For example, the count-up to
shock/noise procedure (e.g., Hare, 1965) involves the cen-
tral presentation of threat cues, and there are no explicit
requirements to process additional information. Within
the response modulation framework, then, it is not clear
why the threat cues fail to elicit comparable EDA in psy-
chopaths and controls.

Despite the absence of an explicit requirement to alter
a dominant response set, we do not believe that the count-
up to shock/noise findings are inconsistent with the re-
ponse modulation hypothesis. In contrast to paradigms
in which psychopaths display normal EDA, there is no
explicit instruction or reason to process the conditioned
threat cues in the quasi-conditioning (i.e., count-up) and
other conditioning paradigms. Indeed, the stimuli used
in such studies are intentionally selected to have no intrinsic
meaning prior to conditioning. Thus processing the mean-
ing or associative network primed by these stimuli typi-
cally relies on relatively automatic shifts of attention (i.e.,
the spontaneous activation and processing of relevant as-
sociations). If, as we have proposed, such automatic shifts
of attention do not occur in psychopathic individuals,
then they would be less affected by the meaning of such
stimuli. Nevertheless, as already noted, psychopaths are
capable of deliberately shifting attention and processing

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Figure 49.9 Skin conductance magnitude of responses to the
central threat cue (i.e., red light) in the reward-punishment
condition of the continuous motor task employed by Arnett,
Smith and Newman (1997). Anx refers to level of anxiety
(Welsh, 1996).
the meaning of such stimuli when there is a reason to do so.

Our use of response modulation in this analysis retains the key aspects of the response modulation concept that involves relatively automatic shifts of attention and a dominant response set. However, the attentional shift and dominant response set are not explicitly operationalized in the experimental context. Rather, they refer to a person's cognitive set. An automatic shift of attention refers to the person's ability to spontaneously activate and process a new (i.e., previously inactive) associative network in response to environmental stimuli. The dominant response set determines which environmental stimuli are deemed relevant and which dimensions of a stimulus context receive further processing. When the meaning and emotional significance of a stimulus is consistent with the dominant response set, they are processed, because no shift of attention is required. However, if the meaning of a stimulus requires the automatic activation and processing of an alternative associative network or set, then it is unlikely to influence the psychopath's behavior regardless of whether it is a central or peripheral aspect of the experimental context. This approach to defining central and peripheral stimuli (i.e., as related to the response/cognitive set) was also used in predicting and interpreting the results of the lexical decision task (e.g., Lorenz & Newman, 2001; Williamson et al., 1991). Despite the fact that letter strings were centrally presented in the absence of other explicit demands for attention, psychopaths were relatively unaffected by the affective connotations of the words, presumably because such effects require automatic shifts of attention.

Despite a long history of equating EDA with fear and anxiety, researchers are becoming increasingly aware that this view is excessively narrow and that EDA should not be regarded as synonymous with fear or negative affect (Damasio, 1994; Newman & Wallace, 1993b; Patrick & Lang, 1999). For instance, Patrick and Lang (1999, p. 214) note that:

skin conductance is a nonspecific index of sympathetic arousal (Venables & Christie, 1973) that is subject to cortical influences (Tranel & Damasio, 1994) and which reflects negative affect only indirectly. Therefore, an alternative to the low fear interpretation of this diminished EDA is the notion that it reflects a deficit in the vigilance and higher associative processing normally evident during anticipation of an emotionally potent event (Miller, Curtin, & Patrick, 1997).

To the extent that EDA reflects a person's tendency to access conditioned associations or other meaningful, internal representations (see Damasio, 1994; Gorenstein, 1991), then it depends on relatively automatic shifts of attention (Newman, 1997). Thus group differences in EDA may often reflect the psychopath's failure to shift attention from environmentally presented cues for punishment to the associative networks that lend emotional support to these cues (see Shapiro, 1965). Although the processing of conditioned emotional stimuli and concomitant EDA appears to be relatively automatic (Ohman & Soares, 1994), a deficit in response modulation may, nevertheless, interfere with the processing of such associations and limit EDA. Though this proposal may be counterintuitive, it is no more so than evidence that shows that psychopaths are less influenced by the incongruity of peripheral stimuli in the Stroop-like tasks that automatically disrupts performance in controls (e.g., Newman et al., 1997).

In sum, we propose that psychopaths' weak EDA may, like other evidence that demonstrates deficient emotion processing in psychopaths, reflect an attentional problem that limits the effects of emotion cues rather than an incapacity for emotion experience. Proponents of the low-fear hypothesis (e.g., Lykken, 1995) have cited psychophysiological experts such as Fowles (e.g., 1980, 1987, 1988), who have interpreted the EDA data as evidence for a fundamental fear/anxiety (i.e., behavioral inhibition system: BIS) deficit in psychopaths. However, even Fowles has begun to endorse alternative explanations. In the conclusion of a recent paper, he writes, "Two perspectives in the recent literature raise the possibility that psychopaths suffer from a broader deficit than a weak BIS and that electrodermal hyporeactivity might relate to this broader deficit" (Fowles, 2000, p. 187). This revised view is highly compatible with the response modulation hypothesis and, in fact, is nearly indistinguishable from our earlier proposals (see Newman, 1997).

**Affect-Modulated Startle**

The final line of research that we review involves the extent to which people's reactions to startle probes are modulated by the affective valence of pictures that they are viewing. Under normal circumstances, people exhibit larger startle responses to noise probes while viewing unpleasant slides and smaller startle responses while viewing pleasant slides relative to startle responses that occur during neutral slides. Psychopaths, however, do not display this linear trend (Patrick et al., 1993). Rather, they display larger startle responses during neutral slides than during the affectively valenced pictures (a quadratic trend). Based on the fact that psychopaths' startle responses during unpleasant slides were, contrary to the typical pattern, smaller than their responses during the neutral slides, Patrick (1994) interpreted these results as further evidence that psychopathy is associated with a reduced capacity to experience fear.

The Patrick et al. (1993) study represents an ingenious application of the startle-probe methodology, but it is not
without important limitations. Specifically, (1) none of the group comparisons involving the startle responses of psychopaths and controls achieved statistical significance; (2) it was difficult to determine whether the groups differed more during neutral slides or during unpleasant slides; and (3) the authors did not distinguish between the groups’ reactions during fear versus other negative-effect slides. In contrast to the basic analyses, subsequent analyses revealed significant differences in startle modulation for subgroups of prisoners with high and low scores on Factor 1 (i.e., callous, unemotional traits) of the Psychopathy Checklist—Revised (PCL-R; 1991).

A more recent paper by Levenston, Bradley, Lang, and Patrick (2000) addresses a number of the questions raised by the initial study. First, the study yielded significant group differences between psychopaths (preselected to have high scores on Factor 1) and controls. Similar to the initial findings, nonpsychopathic controls displayed the “normal” pattern of “startle inhibition for pleasant pictures and startle potentiation for unpleasant pictures,” whereas psychopaths “showed an aberrant pattern of blink inhibition for both pleasant and unpleasant pictures in relation to neutral pictures” (p. 5). Interestingly, however, the predicted Group × Valence interaction was qualified by a significant three-way interaction involving probe time. Whereas “nonpsychopaths showed robust linear modulation (unpleasant greater than pleasant) at both the 800-ms and late-interval times,” psychopaths “showed an emergent linear effect at the late times only” (pp. 5–6). As noted later, this finding raises the possibility that an attentional anomaly is responsible for psychopaths’ unusual performance.

Levenston et al. (2000) also examined group differences for specific slide categories. Psychopaths displayed significantly less startle potentiation than controls during the mutilation, assault, threat, and thrill slides. The only slide category that did not differentiate the groups involved erotic scenes, which apparently elicited greater orienting and startle suppression in controls than the other slide categories did.

Although it is possible to reconcile these recent findings with the low-fear hypothesis (see Levenston et al., 2000), they may also be consistent with the proposed deficit in response modulation (i.e., attentional interpretation). To the extent that processing of affective stimuli is less automatic for psychopaths than for controls, as evidenced by their lack of emotion facilitation in lexical decision tasks, psychopaths may invest more attention and controlled processing resources to the processing of the affective (i.e., both pleasant and unpleasant) pictures. According to Bradley, Cuthbert, and Lang (1993), startle potentiation is inversely related to the amount of attention invested in a slide. Thus, to the extent that psychopaths invest more attention in the affective slides than in the neutral slides, it follows that their startle responses during the neutral slides will be larger than during affective slides.

It seems clear that attention can moderate startle responses, as well as emotion. However, it is not clear why psychopaths invest more attention in the affective slides or withdraw attention from the unpleasant slides more slowly than controls do. One possibility concerns the speed of emotion processing. To the extent that psychopaths’ reactions to the slide stimuli are less automatic and thus involve more effortful processing relative to controls, psychopaths would be slower to reach the stage of affective processing that involves affective valence (e.g., Stage 2 of Scherer’s [1982] model). Consequently, the resulting inclination to approach (i.e., invest more attention) or avoid (withdraw attention) may be slower to develop in psychopaths. Interestingly, this is exactly what was found for both pleasant and unpleasant slides at the 800 ms probe time. Such findings appear to be more consistent with individual differences in processing efficiency than with a general incapacity to experience fear. Moreover, the former interpretation may help to explain lack of group differences on the other (self-report and psychophysiological) measures of emotion processing (see Levenston et al., 2000; Patrick et al., 1993).

This attentional perspective also raises questions about the validity of interpreting valence-specific findings in the startle paradigm. To the extent that an information processing deficit slows processing of the more complex, affect-laden slides, the increased attention needed to process the slide would suppress startle responses during both positive and negative slides. However, because normal affect modulation for pleasant stimuli involves suppression, an information processing deficit that suppresses startle responses would be hard to distinguish from normal, positive modulation. Conversely, the same information processing deficit would result in a distinctive failure of negative modulation that would be difficult to distinguish from a deficit in processing negative affect. The reason is that, in the case of unpleasant slides, any attention-mediated suppression would be opposite in direction to the expected potentiation engendered by unpleasant slides.

Sutton, Vitale, and Newman (2001) recently reported a replication of Patrick et al.’s (1993) findings in incarcerated female offenders. Psychopaths and controls were assigned to groups using the standard cut-scores on the PCL-R and further subdivided according to scores on the Welsh anxiety scale. Noise probes were predicted either 2 or 4.5 seconds following slide onset. A four-way interaction indicated that probe time was a significant factor that moderated group differences in emotion-modulated startle. The key finding was that low-anxious psychopaths failed to display the typical linear trend at the 2 s probe time. Similar to Patrick et al.’s findings, this group displayed smaller startle responses during unpleasant pictures than
during neutral pictures. However, this effect was limited to the early probe time, as in the Levenston et al. (2000) study. At the 4.5 s probe time, low-anxious psychopaths displayed significantly greater negative potentiation than they did for the 2 s probes and displayed as much or more negative potentiation than the other groups at the 4.5 s probe times. Such findings are difficult to reconcile with a low-fear interpretation because psychopaths demonstrate substantial sensitivity to unpleasant slides after 4.5 s. Nevertheless, these findings are compatible with an interpretation that involves information processing efficiency (see Figure 49.10).

Although the startle-modulation studies provide clear evidence of anomalous emotion processing in psychopaths, the results appear to parallel those from other paradigms and are thus amenable to similar interpretation. Specifically, psychopaths' anomalous emotion processing is not specific to threat cues but extends to the processing of positive (e.g., thrill), as well as negative, affect cues (Levenston et al., 2000; Lorenz & Newman, 2001; Williamson et al., 1991). Moreover, psychopaths display normal reactivity to a wide range of emotional cues, both positive and negative, when they are deliberately processing the cues and speed of processing is not an important factor.

**Implications of the Evidence for Psychopaths' Emotion Processing and Psychopathology**

The preceding review of research on psychopathy provides clear evidence that psychopaths are deficient in response modulation, emotion processing, and self-regulation. Moreover, we believe that the evidence supports our contention that psychopaths' deficient response modulation gives rise to their deficits in emotion processing and self-regulation. This view is based, in large part, on the pattern of results that indicates that (1) psychopaths are deficient in emotion processing when it relies on relatively automatic shifts of attention but perform like controls when they are deliberately attending to emotion cues and (2) psychopaths' deficient processing of contextual emotion cues is paralleled by their weak processing of affectively neutral contextual cues. Whereas these findings are consistent with the response modulation hypothesis, the pattern is both more specific and more general than would be expected if psychopathic behavior were due to a primary emotion deficit.

Having demonstrated that a deficit in response modulation may short-circuit emotion processing and self-regulation in the laboratory, we now turn our attention to the implications of psychopaths' deficient response modulation for their nonlaboratory behavior. Toward this end, we consider the consequences of deficient response modulation for emotion processing within the context of Scherer's (1982) model and use examples to illustrate how psychopaths' deficient response modulation may explain the core characteristics of psychopathy, including their deficient emotion responses.

We expect the emotion processing of psychopaths to be relatively normal, at least to a point, before initiating goal-directed behavior. Using Scherer's (1982) model as a framework, we assume that psychopaths would orient attention to novel cues (Stage 1), discern the potential pleas-
ant or unpleasant implications of the information (Stage 2), and identify the motivational significance of the information (Stage 3). Thus, to at least some extent, psychopaths do engage in emotion-related associative processing. However, we believe that once a particular urge (i.e., response inclination) is activated, psychopaths’ emotion processing would typically progress no further. That is, psychopaths would be unlikely to evaluate the adequacy of their anticipated response for achieving their ends (Stage 4) or to consider its consistency with personal/societal values (Stage 5).

Furthermore, once they are engaged in the active organization and implementation of goal-directed behavior, psychopaths’ processing of additional, emotion-related information will typically not progress beyond Stage 1 of Scherer’s model. Considering their level of emotion processing both during, and in the absence of, ongoing goal-directed behavior, it follows that psychopaths will typically respond to immediate incentives by initiating goal-directed behavior. However, their responses will generally reflect minimal consideration of contextual information, alternative response strategies, past experiences, or likely consequences. Moreover, once focused on their goal, psychopaths would have difficulty accommodating feedback from the environment, using associative networks to broaden their perspective, and modifying inappropriate response strategies.

Consider the example of date rape. After sharing a drink with Marie at a bar, Jess suggests that they go to his apartment. With regard to Jess’s emotion processing, we assume that Marie has captured his attention (Stage 1), that he finds something about her appealing (Stage 2), and that he desires to have sex with her (Stage 3). Consequently, Jess acts on the first strategy that occurs to him, “let’s go to my place.” Once Jess focuses on the goal of sexual intercourse, the use of emotional or other contextual cues will require response modulation. Thus, even if Marie is uncomfortable with his advances and resists (or is married to his brother), Jess will be relatively unlikely to process and make use of these cues. Moreover, even if he happens to reflect on his behavior afterward, Jess’s lack of awareness of Marie’s distress and of his “decision” to commit rape will interfere with his perception of responsibility and ability to experience guilt or remorse (see also Shapiro, 1965).

The next example, involving a crime committed by one of our research participants, is somewhat more complex but illustrates how deficient response modulation may relate to the more general characteristics of the psychopathy syndrome. Harry was many months behind in his rent and had received several warnings from his landlord. Then, one day, the landlord came to Harry’s apartment, insulted him, and told him that he would have to leave. At that point, Harry became angry, beat the landlord with a stick, and tied him to a chair. Before leaving the apartment, Harry hurled a final threat: “I’m takin’ the first bus to St. Louis and if you try to stop me I’ll kill you.”

Harry’s behavior illustrates many of the hallmarks of psychopathy and deficient response modulation. First, though paying rent is generally a secondary concern, inability to make rent payments is generally sufficient to revise a person’s priorities. Harry’s failure to revise his priorities and address the problem (i.e., irresponsibility, failure to plan) set the stage for the conflict that led to his arrest. Second, ignoring the moment ethical issues about paying or not paying rent, Harry could have left his apartment without assaulting his landlord. Instead, he committed an impulsive, violent act which reflected a total lack of problem-solving skills. Third, Harry’s beating of and blaming his landlord illustrates the callousness and profound lack of perspective (e.g., empathy) that characterizes psychopathy. Harry reacted emotionally to the concrete threats and immediate insults of his landlord and, on that basis, felt that his actions were justified. However, because he did not consider other contextual information, Harry’s behavior demonstrated a complete failure to appreciate his landlord’s dilemma or his own contribution to the problem (i.e., shallow affect). Finally, in relating his escape plan to the landlord, Harry showed a remarkable lack of insight and poor judgment for a person of normal intelligence.

Harry’s failure to achieve perspective in the heat of the moment fits our response modulation model, but if the problem is due to poor response modulation, why doesn’t he feel remorse later and learn from his experience? Indeed, we have argued that psychopaths have the capacity to reflect on their behavior and draw appropriate inferences using effortful processing resources. We believe that the answer to this question is captured succinctly in the following quote: “I always know damn well I shouldn’t do these things, that they’re the same as what brought me to grief before. I haven’t forgotten anything. It’s just that when the time comes I don’t think of anything else. I don’t think of anything but what I want now” (Grant, 1977, p. 60). Even if psychopaths occasionally do think about the inappropriateness of their behavior and resolve to behave differently, their response modulation deficit would interfere with their ability to follow through. Then, to the extent that they fail to alter their behavior, psychopaths are left either to despise themselves or find some means of rationalizing their behavior.

The ability to reflect on one’s behavior and draw appropriate inferences is also essential for most forms of psychotherapy in which a client and therapist collaborate to achieve insight and plan more adaptive response strategies. Despite the psychopath’s capacity for insight, we believe that such learning will rarely result in stable behavior change. In order to achieve an adaptive, well-socialized adjustment, psychopaths would have to
access this "contextual information" automatically in situations that elicit maladaptive, dominant responses. Unfortunately, doing so is largely incompatible with their response modulation deficit (see Wallace et al., 1999). Although we recognize the difficulties involved, we are hopeful that effective interventions for psychopathy may, nevertheless, be developed. Indeed, it is our hope that a detailed understanding of the psychopath's response modulation deficit will facilitate progress toward this goal.

In summary, as a result of their response modulation deficit and consequent short-circuiting of emotion processing, psychopaths are predisposed to engage in poorly considered, impulsive, and potentially callous behavior. Moreover, their relatively weak processing of corrective feedback diminishes the likelihood of their using controlled processing resources to rehearse and correct their maladaptive response inclinations. Finally, even when they do learn from experience, psychopaths' deficient response modulation typically interferes with their ability to put such knowledge to use.

Pathway II: Emotion-Generated Problems Associated with Dysregulatory Psychopathy

In the previous section, we proposed that psychopathy reflects a general deficiency in response modulation that curtails emotion processing and hampers self-regulation. However, psychopathy is a relatively unique form of psychopathy that involves inadequate as opposed to excessive emotional conflicts. More commonly, psychopathy is associated with exaggerated or maladaptive reactions to intense emotion stimuli. Examples of such dysregulatory psychopathy (Wallace & Newman, 1997) include the "loss of control" drinking seen in some forms of alcoholism, the phobic avoidance seen in certain anxiety disorders, the excessive rumination on personal inadequacies manifested by some depressed individuals, and the self-destructive, poorly regulated behaviors (e.g., inappropriate spending, aggression, sexual behavior) seen in borderline personality disorder. In this section, we address the deficits in response modulation and self-regulation that occur in stimulus contexts that have acquired intense emotional significance.

Whereas psychopaths' emotion processing is limited by their failure to process contextual emotion cues, the problem in dysregulatory psychopathy is that emotion processing is short-circuited owing to the intensity of an emotional response. Recall that "the inverse relationship between the intensity of an emotion and the length of the latency time is actually one of the most powerful design features of the emotion mechanism" (Scherer, 1994, p. 129). Accordingly, when intensity is very high, as in emergency situations, "the organism cannot afford the luxury of repeated evaluations" and thus reverts to the "wisdom of the body" (Scherer, 1994, p. 129). In dysregulatory psychopathology, people are especially sensitive to certain emotion cues, but their resulting sense of urgency causes them to consider a limited range of associations and to react with prepotent (i.e., dominant) responses (see Wallace & Newman, 1997).

To investigate this phenomenon, we typically select individuals with particular sensitivities (e.g., to physical or social threat cues) and then assess their behavioral and attentional regulation following motivational/emotional manipulations that do or do not prime their concerns. Although such manipulations often lead to improved performance owing to the motivational significance of emotion cues (Gray, 1987), we have demonstrated that they often impair performance when secondary or peripheral processing is needed to regulate ongoing behavior.

In a study designed to test these theoretical propositions, Wallace and Newman (1990) examined motor inhibition (i.e., self-regulation) under experimental conditions designed to match the emotional sensitivities of their research participants. According to Gray (1981), neurotic extraverts are hypersensitive to reward cues, whereas neurotic introverts are especially sensitive to punishment cues. These groups are typically defined using the Extraversion and Neuroticism scales of the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975). Whereas neurotic extraverts are identified with trait impulsivity and are usually compared with stable introverts (i.e., low-impulsive individuals), neurotic introverts are considered to be trait anxious and are usually compared with stable extraverts (low-anxious individuals). After instructing participants to trace a circle, we told them to "trace the circle again but, this time, trace the circle as slowly as possible" (Wallace & Newman, 1990, p. 00–00). Thus tracing was their dominant response and monitoring the speed of tracing was an explicit secondary consideration. As predicted by our theoretical framework, neurotic extraverts displayed the poorest inhibition in the reward condition, and neurotic introverts traced the fastest in the punishment condition (see also Bachorowski & Newman, 1985, 1990; Nichols & Newman, 1986; see Figure 49.11).

A constructive replication of this work was undertaken to examine the attentional consequences of engendering high nonspecific arousal by presenting emotionally significant stimuli to samples with more diverse sensitivities. Specifically, we (Newman et al., 1993) used a letter-number discrimination task in which a character string (i.e., five numbers or letters) appeared in the center of the computer monitor on 75% of the trials. On 25% of the trials, the string appeared unpredictably in one of the four corners. Participants were instructed to respond as quickly as possible by pressing one of the two buttons to indicate whether numbers or letters composed the character string. At the beginning of each trial, participants were presented
words (e.g., scale) were presented to women with and without eating disorders. In a third study, we identified specific “self-discrepancies” for each participant using the Selves questionnaire (Higgins, 1987) and then primed these self-discrepancies on a subset of trials. Results were consistent across all three experiments. There were no group differences in the speed with which participants correctly identified the string type when it was presented in the more common, central position, regardless of the ready stimulus. However, when trials were initiated by an emotionally significant cue, individuals with the specified sensitivity responded significantly more slowly to the peripheral strings relative to controls. These experiments show that priming an affectively significant concern may interfere with participants’ ability to modulate a dominant response set (see Figure 49.12).

Following Gray (1981, 1987), we have proposed that motivationally significant cues increase arousal in proportion to their perceived significance and to the physiological reactivity of a person’s “nonspecific arousal system.” Reactivity of the nonspecific arousal system, in turn, relates to individual differences in Eysenck’s (Eysenck &
Eysenck, 1975) trait neuroticism. As nonspecific arousal increases, a person perceives an increasing sense of urgency that narrows the focus of attention, promotes the rapid selection and initiation of responses, and decreases behavioral flexibility (Wallace et al., 1991). High nonspecific arousal may reflect the intensity of environmental elicitors, temperament-related differences in emotional reactivity (neuroticism), or both. Moreover, because controlled attention follows automatic attention, controlled processing resources are disproportionately focused on the automatic products (i.e., results) of emotion processing and are less available for checking or regulating these automatic products. Consequently, prepotent, relatively automatic interpretations and responses are made without the benefit of effortful evaluation or regulation (Wallace & Newman, 1997). Though such reactions are typically appropriate, they are not always. To the extent that they are stable, inflexible, and maladaptive, such reactions may give rise to psychopathology.

Deficits in self-regulation that stem from hyperarousal may even involve diminished processing of peripheral punishment cues and thus resemble deficits seen in psychopaths. For instance, investigations of passive avoidance learning in neurotic extraverts have revealed results that closely resemble those obtained with psychopathic offenders. Specifically, under conditions involving monetary rewards and punishments, neurotic extraverts fail to pause following punishment feedback and display significantly more passive avoidance errors than controls (Patterson, Kosson, & Newman, 1987). Despite the similarity of these results to those obtained with psychopaths, the underlying process appears to be different (see Newman & Wallace, 1993). Whereas neurotic extraverts are hypersensitive to reward stimuli, this does not seem to be the case for psychopaths (Newman et al., 1990). Conversely, whereas psychopaths display response modulation deficits in affectively neutral contexts, the same does not appear to occur in neurotic extraverts (Newman & Wallace, 1993a).

Summary and Implications for Dysregulatory Psychopathology

We have proposed that individuals with high levels of trait neuroticism (emotional reactivity) are prone to the development of dysregulatory psychopathology. More specifically, we hypothesized that their hyperreactivity to highly salient emotion cues results in a strong "call for processing" that they answer by allocating attention to the emotional cues and the automatic products of emotion processing (i.e., related associative networks). Moreover, their heightened reactivity results in high arousal, which increases the speed, force, and focus of subsequent behavior. Consequently, their reactions to emotional situations are initiated more rapidly, are more difficult to interrupt, and occur with less attention to peripheral cues or other considerations (Wallace et al., 1991; Wallace & Newman, 1997). In addition, the strong call for processing commands a disproportionate amount of controlled processing resources, which, in turn, leaves relatively little capacity for self-regulation (which relies on controlled processing resources). The result is that neurotic individuals are prone to emit relatively automatic and frequently maladaptive responses that reflect a short-circuiting of normal emotional and self-regulatory processing. In other words, intense emotional reactions may interfere with the flexible allocation of attention (i.e., response modulation), impair self-regulation, and result in various forms of dysregulatory psychopathology.

In psychopathy, the response modulation deficits preclude the use of contextual emotion cues whenever attention is actively directed elsewhere. In contrast, the emotion processing of neurotic individuals is relatively normal owing to the acquired and highly situation-specific nature of their response modulation deficits. The importance of this distinction is that, relative to psychopaths, neurotic individuals have extensive practice in processing emotion material and thus have a better developed emotion structure. In terms of Scherer's (1982) model, the emotion processing of such individuals typically includes consideration of all five stages. As a result, their emotion processing normally transcends consideration of immediate goals and their likelihood of achieving them to include consideration of self-standards and societal reactions. Moreover, neurotic individuals are more likely to perceive connections between present and past circumstances, as well as the future implications of present events. Furthermore, they are likely to consider a variety of affectively related experiences, which influences their perspective on immediate circumstances. In light of their more elaborate emotion processing, we assume that the associative networks of neurotic individuals are also more extensive and interconnected than those of psychopathic individuals.

The heightened risk for psychopathology manifested by neurotic individuals (Trull & Sher, 1994) does not, in our opinion, reflect a general deficit in emotion processing. Rather, their hyperreactivity to emotional stimuli makes them vulnerable to the development of maladaptive perceptions and responses in particular emotion-related contexts. In most cases, their maladaptive behavior is acquired gradually as a result of an unfortunate person-by-situation interaction.

For example, after experiencing a panic attack in a university lecture hall, a student (Sally) may experience anxiety as she prepares to attend her next class in the same lecture hall. If Sally is hyperreactive to emotion cues, this experience will initiate a relatively strong call for processing and more extensive emotion processing. Such processing may include evaluating the threat, her ability to cope with the threat, and the personal and social impli-
cations of attending versus skipping her class. All things considered, she may decide to attend the class. However, as she approaches the classroom and her arousal increases, Sally may again experience a strong desire to avoid the class. Unfortunately, Sally's capacity for emotion processing at this point will be strongly influenced by her high level of nonspecific arousal. In particular, her attention will focus more sharply on her concern (fear) and dominant response (escape). In addition, her sense of urgency will promote the rapid selection and initiation of her dominant response. Moreover, these factors will simultaneously limit the accessibility of contextual cues and Sally's ability to directly use controlled processing resources to evaluate and correct her dominant response inclinations. Whereas a person with a less reactive, nonspecific arousal system might resist the urge, Sally's hyperreactivity is likely to short-circuit self-regulation and result in her skipping the class.

This example illustrates how hyperreactivity to emotion stimuli may interfere with making the most adaptive response in particular situations, but we believe that the development of maladaptive behavior in vulnerable individuals reflects maladaptive learning that develops gradually over time. To continue the example, owing to multiple sources of stress and arousal or other vulnerabilities, Sally may be unable to mobilize sufficient resources to fight her urge to avoid her lectures. With each lecture, Sally's struggle to regulate her behavior may become more short-lived as she accepts the inevitable result. Moreover, with each such experience her associative network will increasingly reflect her new response bias. In the end, skipping the class will become a dominant and relatively automatic response, and Sally's initial consideration of other factors and responses will be less well represented in her associative network.

Although Sally's problem—skipping her class—is likely to interfere with her performance in that class, it could remain a relatively circumscribed problem. However, if she now experiences a panic attack in another social context (e.g., a shopping mall), Sally's fears are likely to grow, and her dominant means of coping with such fears is already well established. Thus, in a manner analogous to the class experience, she is likely to struggle at first but to choose to avoid more and more places.

This example illustrates the development of dysregulatory psychopathology. When a person experiences intense emotions that limit other emotion and information processing, he or she responds on the basis of the most readily available considerations and coping responses. Although prepotent responses are often appropriate, they may also be maladaptive for any number of reasons. Quite commonly, it is simply the person's overreaction or harsh evaluation of his or her response that confers emotional significance to the situation. Regardless of the factors that confer the emotional significance, to the extent that the circumstances are encountered repeatedly, that they elicit high arousal, and that they result in the same coping responses time after time, the sequence becomes increasingly automatic and alters the structure of a person's associative network. Relatedly, processing of alternative considerations and means of responding becomes increasingly difficult. Consequently, in the absence of concerted effort or outside intervention, such maladaptive reactions are likely to develop into psychopathology.

Once a maladaptive sequence reaches a certain level of automaticity, a number of factors serve to maintain the problem. First, by virtue of its automaticity, a person may have more difficulty monitoring the problem and, even if the problem does attract attention, alternative considerations and responses will have become relatively inaccessible. However, in contrast to psychopath, neurotic individuals are predisposed to notice when their behavior violates a personal standard, owing to their reactivity to emotional events and tendency to answer emotion-related calls for processing. In addition to violating personal standards, maladaptive behaviors typically elicit unpleasant reactions from others and hamper social and occupational adjustment. Such sources of frustration and negative affect are potent stimuli for neurotic individuals and generally attract their attention. Thus neurotic individuals would seem to be well equipped to engage in constructive self-regulation and to modify their behavior.

Unfortunately, their tendency to react to emotion cues with excessive levels of nonspecific arousal also appears to disrupt adaptive self-regulation. The reason is that cues for self-regulation (e.g., self-discrepancies, frustration, negative feedback) increase arousal, as well as eliciting attention. Under normal circumstances, the arousal engendered by a call for processing facilitates reflectivity and the constructive redirection of attention (see Patterson & Newman, 1993). However, to the extent that a person's attempt to monitor, evaluate, and alter behavior directs attention to an associative network that involves a well-rehearsed, emotional sequence that reliably results in maladaptive behavior, it is unlikely to facilitate adaptive self-regulation. Ironically, such attempts to regulate behavior may only serve to increase arousal and trigger the prepotent, maladaptive response (see Wegner, 1994). Consistent with this speculation, several investigators have discussed how people's critical self-evaluations of their alcohol use may paradoxically disinhibit further abuse because using alcohol is their dominant means of coping with negative affect (Marlatt & Gordon, 1985; Tiffany, 1990; Wallace & Newman, 1997).

With regard to treating this type of dysregulation, we believe that the implications are more straightforward and the prospects for success much better than they are for psychopathy. We believe that, in dysregulatory psychopathology, high arousal comes to interfere with response modulation and thus constrains emotion processing and
self-regulation, resulting in the development and maintenance of relatively automatic, maladaptive behavioral strategies. The formula for treating such dysfunctions would seem to require reversing this causal sequence. Specifically, using the therapeutic relationship to create a safe, supportive, relatively low-arousal environment, it should be possible to analyze problem situations and generate clear and specific strategies for behaving differently. Such strategies may be practiced initially in low-stress situations and then in more stressful ones. Optimaliy, the individual would then practice his or her alternative coping responses in the presence of the emotional circumstances that have routinely elicited his or her maladaptive behavior. With such practice, it should be possible to "deautomatize" maladaptive thoughts and behavior and "reatomatize" (e.g., Kanfer & Geelick, 1986) more adaptive ones so that the relevant associative networks and emotion responses acquire a more adaptive structure. In contrast to psychopaths, whose intrinsic deficits in response modulation interfere with their ability to pause, reflect, and implement a therapeutic intervention, the prognosis for individuals with dysregulatory psychopathology is more optimistic owing to their ability to access and utilize therapy-related training.

Summary

In this chapter, we have addressed the role of response modulation in coordinating the interaction of emotion and attention and the implications of this interaction for psychopathology. When people encounter motivationally or emotionally significant stimuli, they experience a call for processing. To the extent that people answer the call for processing, they (1) may use the resulting information to improve the quality of their immediate responses, (2) modify associative networks and thus the automatic associations that are primed on future occasions, and (3) are able to utilize existing associative networks to enhance perspective on present circumstances. Owing to its role in moderating emotion-attention interactions, response modulation exerts a major influence on a person's awareness of emotion stimuli, on his or her development of emotional reactions, and on his or her ability to utilize the results of emotion processing.

To illustrate how potential problems in response modulation and emotion processing may influence the development of psychopathology, we considered two disparate forms of psychopathology. The literature on psychopathy demonstrates (1) how a fundamental deficit in response modulation is sufficient to disrupt emotion processing and thus the self-regulation of behavior; (2) how a failure to pause and process emotion cues alters the development of associative networks, particularly in connection with emotion experiences that normally interrupt ongoing, goal-directed behavior (i.e., behavioral inhibition in response to threat cues); and (3) how response modulation deficits interfere with a person's ability to utilize diverse internal representations (i.e., associative networks), which may deter them from integrating information from different time periods and diverse learning experiences and thus severely constrain the development of perspective (see also Newman, 1998; Shapiro, 1965). In our view, it is this difficulty utilizing past learning and other potentially important associations (e.g., personal resolutions) while engaged in goal-directed behavior that creates the greatest obstacle for anyone concerned with altering the psychopath's behavior.

Regarding the second pathway to psychopathology, we discussed how intense reactions to emotion stimuli may come to hamper response modulation and the regulation of maladaptive behavior. More specifically, we proposed that certain people are predisposed by temperament or experience to react with high arousal to particular emotion stimuli. This arousal, in turn, creates a sense of urgency and simultaneously narrows the focus of attention to specific, emotion-related environmental cues and internal associates, thus interfering with response modulation and normal information processing. Moreover, the person's narrow focus on emotion-eliciting cues serves to maintain his or her intense emotions and maladaptive coping strategies, resulting in the development of psychopathology. We do not believe that this form of psychopathology, in contrast to psychopathy, reflects a fundamental (i.e., primary) deficit in response modulation. Thus, we assume that affected individuals have a greater capacity for using specific environmental and/or internal cues to initiate self-regulation and are thus more amenable to therapeutic interventions designed to modify their emotion responses.

In conclusion, emotions play a major role in organizing responses to specific environmental circumstances. In addition to influencing immediate reactions to emotionally significant events, such reactions contribute to the development of associative networks, thus increasing or decreasing the likelihood that particular reactions will occur in the future. We have proposed that response modulation deficits alter immediate reactions to emotion stimuli and, by extension, that they may alter the development of associative networks. In our view, this framework clarifies the processes by which maladaptive attention-emotion interactions lead to the development and maintenance of psychopathology. To the extent that emotions fail to direct attention to significant stimuli and/or internal considerations, as occurs in psychopathy, people are less likely to process a variety of important information; their associative networks will fail to reflect such information; and thus their automatic reactions to such circumstances will be relatively unaffected by experience (i.e., learning). Moreover, to the extent that emotion stimuli produce high arousal and cause a person to focus attention narrowly on
particular concerns and response inclinations, emotionally reactive individuals (e.g., neurotics) will also be at high risk for developing information processing deficiencies, selectively impoverished associative networks, and inflexible maladaptive response inclinations.

NOTES

1. Preparation of this chapter was supported by a grant from the National Institute of Mental Health. We thank Chad Brinkley, Donal MacCooe, Kristi Hittt, and Jennifer Vitale for their helpful comments on an earlier version of this chapter.

2. We use the term nonspecific arousal to refer to activity in Gray's (1981) nonspecific arousal system. Activity in the nonspecific arousal system increases in response to perceived threats and reward opportunities and acts to increase the intensity of approach- or avoidance-related behaviors.

3. Importantly, emotion-induced arousal may also facilitate dominant responses, as illustrated by the phenomenon of "drive summation" (see Gray, 1987, pp. 179–184).

4. Another possibility is that an individual's emotional response may be too weak to signal an effective "call for processing" and thus may hamper response modulation. We do not discuss this scenario in this chapter because (1) this possibility is thoroughly addressed by Lykken (1995) in his low-har hypothesis and (2) we are unaware of any evidence that provides differential support for this pathway (i.e., that cannot be explained by the response modulation hypothesis that is described in the next section of this chapter).

5. Although our lab's initial research on passive avoidance learning (i.e., Newman, Widom, & Newman, 1985) tested hypotheses by comparing low-anxious psychopaths and controls, we abandoned this strategy between 1986 and 1990 when we adopted Hare's (1980, 1981) Psychopathy Checklist (PCL) as our measure of psychopathy. Because Hare's checklist is relatively independent of anxiety, we assumed initially that it would not be important to stratify our sample using a measure of anxiety. However, with time it became apparent that a large percentage of individuals who met the checklist criteria for psychopathy had high levels of neurotic anxiety and performed differently than low-anxious psychopaths on laboratory tasks (see Newman & Brinkley, 1997; Schmitt & Newman, 1999). Thus, owing to our interest in studying Cleckley psychopaths, who are distinguished by their low neurotic anxiety, we returned to our focus on low-anxious psychopaths and controls beginning with this publication (Newman et al., 1990).

REFERENCES


