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COGNITIVE BIASES IN EMOTIONAL DISORDERS: INFORMATION PROCESSING AND SOCIAL-COGNITIVE PERSPECTIVES

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In the past several decades emotion and psychopathology researchers have devoted a great deal of attention to the study of emotions such as anxiety and depression as they are experienced in the normal range, as well as to their more extreme manifestations, seen in clinically significant emotional disorders such as anxiety and mood disorders. During this time research and theory from various perspectives have been converging on a consensus that views emotion and cognition as closely intertwined. The complex interplay between the two is still being unraveled and explored. Nonetheless, the field has reached a clear appreciation of a number of factors that play a part in this emotion-cognition interface—both for "normal" levels of these emotions and for maladaptive forms of these emotions seen in emotionally disordered individuals. These factors include the evolutionary forces that shaped the architecture of emotion systems at the species level, as well as the basic and social-cognitive learning processes that affect the ontogenesis and functioning of these emotion systems at the individual level.

Plutchik (1984) argued from a psychoevolutionary perspective that "cognitions have largely evolved in the service of emotions" (p. 209). According to Plutchik, the interaction of cognition with emotion allows our emotional behaviors to be adaptive responses to biologically significant events. In addition, Gray (1990) has also argued for a "genuine interweaving of emotional and cognitive processes in the workings of the brain" (p. 271). This related argument is that over the course of human evolution, human beings were selected for their ability to learn information about reinforcing events (predators, food, mates). Further, because reinforcers elicit primary emotions, cognitions (appraisals of reinforcing events) are linked to the experience of emotion. Finally, Gray (1990) also cites research which implicates the same neuroanatomical structures and systems in the brain as being involved in important emotion- and cognition-related functions (e.g., hippocampus and amygdala).

Recently, Cosmides and Tooby (2000) summarized the evolutionary view by noting that emotions serve as "superordinate programs," or modules of the mind, which are responsible for setting priorities. According to this model, when an emotion is elicited, it activates some subordinate mechanisms (e.g., attention, heuristic processing, or action-readiness programs) and deactivates others (e.g., higher level goals, systematic processing, digestion). In contrast to most other adaptations or modules (cf. Barkow, Cosmides, & Tooby, 1992), emotions are a "mode of operation for the entire psychological architecture": They are, in a sense, primary.

A fundamental theme of recent emotion research is that biased cognitive processes are central features of probably

all emotional disorders (as well as of normal, healthy emotional functioning). As we discuss in this chapter, these biases may have both a phylogenetic and an ontogenetic basis. Nowhere has the phylogenetic or evolutionary basis of biased cognitive processing been more evident than in human and nonhuman studies of fear and phobias, which have demonstrated that these emotions do not tend to occur to an arbitrary group of objects or situations associated with trauma. Instead, it appears that human and nonhuman primates have an evolutionarily based predisposition to acquire fears and phobias of certain objects or situations that may once have posed a threat to our early ancestors (e.g., Cook & Mineka, 1990, 1991; Öhman, Dimberg, & Öst, 1985; Öhman & Mineka, 2001; Seligman, 1971; see also chapter 14, this volume).

The thumbprint of evolutionary forces may also be evident in other examples of emotion-cognition interactions. In particular, much attention has been focused on how anxiety and depression may differentially affect cognitive processing of emotional (usually mood-congruent) material, possibly based on adaptive pressures that may have shaped the kinds of cognitive biases seen in these emotional disorders (e.g., Mathews, 1993; Mineka, 1992; Williams, Watts, MacLeod, & Mathews, 1988, 1997). Three kinds of mood-related cognitive biases have been examined: attentional biases, memory biases, and judgmental/interpretive biases. Underlying this work is the belief of some researchers that the neuronal or neuroanatomical architecture of emotion systems is, by design, responsible for the biases in cognitive processing (Cosmides & Tooby, 2000). We review the extant literature on information processing biases in anxiety and depression in the first half of this chapter.

Although it is not derived from an evolutionary framework, a complementary approach to cognition and emotion emphasizes the antecedence of biased cognition to emotion. This approach stems from two rich and interrelated traditions: social cognitive appraisal theories of stress and emotion (e.g., Lazarus, 1991) and cognitive-behavioral approaches to psychopathology (e.g., Beck, 1967, 1976). Often interrelated, these two traditions emphasize the centrality of the *subjective*, and often biased, interpretation of reality in the elicitation of normal and abnormal emotion. Within this complementary approach to the cognition-emotion interface, three domains of mood-related social-cognitive biases have been examined: self-related, other-related, and future-related cognitions. These three domains are reviewed in the second half of this chapter.

Rather than attempt to demarcate the boundary between the evolutionary ("primacy of emotion") and social-cognitive ("primacy of cognition") models, we treat them as complementary and at times overlapping. Separating the two is sometimes reminiscent of the debate between proponents of emotion primacy versus those of cognition primacy (cf. Lazarus, 1984; Zajonc, 1984; see also Scherer, 1999, for a recent integration). In many ways, that debate has been settled. One solution has been to elaborate on the term *cognition* to include both lower level (e.g., automatic attention or perception) and higher level (e.g., conscious appraisal) processes. Another solution has been to acknowledge the temporal fugue-like nature of cognition and emotion. As Lazarus (1999, p. 8) notes, "depending on where one begins one's entry into the flow [of emotion and cognition], which is arbitrary, any response can also be a stimulus." Thus, in both of the following sections and in the conclusion of this chapter, we discuss models of cognition in emotional disorders that fit within one and sometimes both of these emotion-cognition primacy frameworks.

Information Processing Biases in Anxiety and Depression

Attentional Biases

Because our cognitive resources are limited, we constantly need to make numerous decisions, many of which are automatic and unconscious, as to which of the infinite number of stimuli that surround us will be processed and which will be discarded. Mood-congruent attentional biases are said to occur when this rapid decision-making process is systematically influenced by the emotional meaning of stimuli. For example, when anxious individuals read the newspaper, their attention may frequently be drawn to articles with threatening content. Similarly, any small insect may quickly attract the attention of a person who has a spider phobia. During the past two decades, many studies have demonstrated that emotional disorders are indeed associated with mood-congruent attentional biases (for a comprehensive review, see Williams et al., 1997).

In this section we first consider the evidence for attentional biases in anxiety and the anxiety disorders and then in depression. We also consider the types of stimuli that produce these biases: Do mood-congruent attentional biases occur with any emotional material, or are they specific to negative or threatening stimuli? Does the material need to be specific to the person's concerns or specific diagnosis, or is a generally negative (or even positive) valence all that is necessary? Several other questions are also addressed: Are there particular stages in the information processing sequence in which the biases occur? Are these biases associated with certain stable traits, or with transient mood states, or with their interaction? First, however, we introduce the paradigms and techniques most frequently used to detect these biases in the laboratory.

In one paradigm, the visual dot probe, individuals with emotional disorders are expected to show both facilitated

and disrupted performance in response to emotional stimuli (C. MacLeod, Mathews, & Tata, 1986). This obviates any interpretive problems that arise with some other paradigms in which bias is always indexed by disrupted performance with the emotional stimuli. In the dot-probe task, pairs of words appear simultaneously on a computer screen, one above the other. Participants are instructed to read aloud the top word and to detect as quickly as possible a small dot probe that occasionally replaces one of the words. MacLeod et al. (1986) found that relative to controls, clinically anxious participants were faster to detect the probe when it replaced a threat word rather than a neutral word. If, however, the probe replaced a neutral word that appeared together with a threat word, the performance of anxious participants was slower. Nonanxious participants tended to show an opposite bias. As MacLeod et al. (1986) emphasized, the dot-probe paradigm is an excellent way of examining attentional biases because it is unlikely that participants' responses to the probe are affected by any type of response bias. For example, in earlier paradigms, such as the perceptual defense method (e.g., Small & Robins, 1988), participants might simply have been reluctant to respond to emotionally charged material. Moreover, it has also been shown that the probe detection latency is a sensitive way of assessing visual attention (Navon & Margalit, 1983).

Despite the superiority of the dot-probe paradigm, many more studies have used the emotional Stroop test, in which the experimental stimuli are expected only to interfere with measured performance (i.e., never to facilitate it). In the Stroop task, participants are asked to name as quickly as possible the color of ink in which stimuli are printed, while ignoring any other aspects of these stimuli (e.g., their semantic meaning; Stroop, 1935; cf. C. MacLeod, 1991, for a review). In the classic version of this task, when the words are color names printed in an incongruent color of ink (e.g., the word "blue" printed in red ink), the response latency is considerably larger than to noncolor or meaningless words. Apparently, the to-be-ignored aspect of the stimulus (i.e., its semantic meaning) is salient enough to compete with its attended aspect, the color of the ink with which it is written, resulting in a strong interference effect (see C. M. MacLeod, 1991). In the emotional version of the Stroop test (e.g., Gotlib & McCann, 1984), certain types of participants (e.g., emotionally disordered patients) show longer color-naming latencies to experimental stimuli (such as emotion-related words) than to neutral nonemotional stimuli, whereas normals show comparable latencies to both types of stimuli. This result is presumed to demonstrate that the emotionally disordered patients are devoting a disproportionate amount of attention to the meaning of disorder-relevant emotional words relative to neutral words. The main advantages of this task are its rich cognitive background literature and ease of administration and the fact that it is less susceptible to response-bias interpretations than earlier paradigms, such as perceptual defense, because participants are not asked to report the emotionally charged word. Nonetheless, some argue that the color-naming interference is actually not a completely pure measure of attentional bias, because the interference in this task may still be the result of processes that are related to the response rather than to the input stage of information processing (e.g., Mogg & Bradley, 1998; see also J. M. G. Williams, Mathews, & MacLeod, 1996, and J. M. G. Williams et al., 1997, for reviews of emotional Stroop studies).

Attentional Biases in Anxiety and Anxiety Disorders

Attentional bias to threatening material has been shown to occur in a wide range of anxiety disorders, including generalized anxiety disorder (GAD; see, e.g., Mogg, Bradley, & Williams, 1995), panic disorder (e.g., Hope, Rapee, Heimberg, & Dombeck, 1990), posttraumatic stress disorder (PTSD; e.g., McNally, Kaspi, Riemann & Zeltin, 1990), social phobia (e.g., Hope et al., 1990), specific phobia (e.g., Kindt & Brosschot, 1999), and obsessive-compulsive disorder (OCD; e.g., Tata, Leibowitz, Prunty, Cameron, & Pickering, 1996). With subclinical anxious participants (i.e., normal individuals with high levels of trait anxiety), some studies have found attentional biases for negative stimuli (e.g., Bradley, Mogg, Falla, & Hamilton, 1998; Broadbent & Broadbent, 1988), but others have not (e.g., Martin, Williams, & Clark, 1991; Richards, French, Johnson, Naparstek, & Williams, 1992). The Martin et al. (1991) study used the emotional Stroop to compare patients diagnosed with GAD and high-trait-anxious individuals. Interestingly, although the two groups showed comparable levels of trait anxiety, only the patients were slower in color-naming threatening words than nonthreatening words. One possibility is that high-trait-anxious participants, in an attempt to follow the task's instructions, may use conscious strategies in order to override their tendency to be distracted by the threatening words (Mathews & MacLeod, 1994).

Automatic Versus Strategic Biases?

If high-trait-anxious participants can use conscious strategies to overcome their attentional biases, are the attentional biases automatic or strategic (Bradley, Mogg, Millar, & White, 1995; Mogg, Bradley, & Williams, 1995; Mogg, Bradley, Williams, & Mathews, 1993). In tasks such as the Stroop or the dot probe, when stimuli are presented subliminally, participants are not aware of the semantic content of the material to which they are exposed. Thus any bias that is detected under these conditions is presumably automatic because it takes place at a preconscious level of awareness that does not allow it to be affected by strategic

or conscious efforts. In the more widely used supraliminal presentation mode, the exposure duration of stimuli is long enough so that participants are aware of their semantic content. Several studies have shown that GAD was associated with attentional bias to negative words that were presented either supraliminally (MacLeod et al., 1986; Mogg, Bradley, et al., 1993; Mogg, Bradley, & Williams, 1995) or subliminally, using both the emotional Stroop (Bradley, Mogg, Millar, & White, 1995; Mogg, Bradley, et al., 1993) and the dot-probe (Mogg, Bradley, & Williams, 1995) tasks.

However, studies of nonclinical high-trait-anxious individuals have sometimes shown that emotional Stroop interference occurs only with subliminal (not supraliminal) presentations, which do not allow participants to use strategies that are based on conscious examination of the stimuli (e.g., Bradley, Mogg, & Lee, 1997; Fox, 1996; Mogg, Kentish, & Bradley, 1993).[1] A clinical diagnosis is possibly associated with some kind of breakdown of cognitive controls such that strategic controls that might be used by high-trait-anxious participants to suppress any supraliminal bias cannot operate (Mathews & MacLeod, 1994). This might explain the fact that almost none of the published studies that used the supraliminal emotional Stroop task with diagnosed anxious patients yielded null results (Williams et al., 1997).

In yet other studies this preconscious attentional bias has been shown to serve as a vulnerability marker for more serious levels of clinical distress. For example, C. MacLeod and Hagan (1992) studied women undergoing a test for cervical cancer. The researchers administered the emotional Stroop task for threatening information to the women before they were given the test. For the half of the women who eventually received a diagnosis of cervical pathology, the interference index on the subliminal Stroop task was the best predictor of a dysphoric reaction to the diagnosis ($r = -.54$, $p < .05$). In a similar experiment, MacLeod and Ng (cited in C. MacLeod, 1999) also found that early measures of subliminal threat interference on the Stroop task predicted response to a different stressful life event. Specifically, the emotional Stroop was administered to Singaporean high school graduates several weeks prior to their departure to Australia to attend university. Threat interference was the best predictor of the amount of state anxiety experienced on arrival in Australia.

The Emotionality and Specificity of Experimental Stimuli

Next we address issues that are related to characteristics of the stimuli that produce mood-congruent attentional biases. The question of emotionality is whether attentional bias is specific to negative or threatening stimuli or whether it can occur with any, even positive, emotional material (see Ruiz-Caballero & Bermudez, 1997, for a review). Some studies have shown interference effects for positive stimuli (e.g., Martin et al., 1991, Exp. 4; Riemann & McNally, 1995). In others (Cassiday, McNally, & Zeitlin, 1992; McNally, Riemann, Louro, Lukach, & Kim, 1992), positive stimuli produced some interference, but not as large in magnitude as that caused by threatening stimuli; thus the general emotionality hypothesis was only partially supported. For example, Cassiday et al. (1992) found that rape victims with PTSD showed greater interference for high-threat words (e.g., *rape, penis*) relative to positive (e.g., *love, friendship*) or moderate-threat (e.g., *crime, bruises*) words, although the interference effect for the two latter word types was also significant. (It is important to note, however, that in this study the highly threatening and positive words were not equated for salience.) In spite of these few studies that show interference with positive stimuli under some conditions, most studies that have used both negative and positive material as stimuli found interference effects only for the negative stimuli (e.g., Bryant & Harvey, 1995, in PTSD; McNally, Amir, et al., 1994, in panic disorder; Mogg, Bradley, et al., 1993, in GAD; see Ruiz-Caballero & Bermudez, 1997, for a review).

Several methodological issues have been suggested as possible explanations for the infrequent findings of attentional biases for positive stimuli, including, for example, whether the positive words are antonyms of anxiety-related words (and therefore strongly semantically related to these words; e.g., Mathews & Klug, 1993; Small & Robins, 1988). However, none of the factors studied can fully account for those few findings of attentional biases to positive stimuli. Thus the fact that most studies failed to show any interference effect for positive material indicates that emotion-related attentional biases are generally specific to threatening, negatively valenced stimuli

One very interesting study by Mathews and Klug (1993) used the emotional Stroop paradigm in order to examine both the emotionality and the specificity issues (i.e., do the biases occur only with stimuli directly related to the participant's worries and concerns?). The two groups in their study were a mixed diagnostic group of anxious patients and a group of controls, and the five sets of stimuli varied along the dimensions of valence (positive vs. negative) and relatedness to anxiety: negative and anxiety-related (e.g., *nervous, tense*), negative and anxiety-unrelated (e.g., *sin, negative*), positive and anxiety-related (e.g., *fearless, relaxed*), positive and anxiety-unrelated (*beauty, delightful*) and matched neutral words. The results showed that color-naming latencies in the anxious group were longer for both negative and positive anxiety-related words (but not for any of the anxiety-unrelated words) than for neutral words. The control participants' latencies did not vary significantly across the five word types. Thus in this study relatedness to anxiety and not simple emotionality or valence of the words was critical

in explaining the anxious participants' patterns of interference. Unfortunately, most studies that used both positive and negative stimuli did not simultaneously address the issue of specificity as did Mathews and Klug (1993). It is therefore unclear if they too would have found Stroop interference for positive anxiety-relevant words.

Additional studies have examined the specificity issue independent of the emotionality issue. For example, Hope and colleagues (Hope et al., 1990), studying patients with social phobia and panic disorder, used the emotional Stroop to examine color-naming interference for both social- and physical-related threat words. As predicted by the specificity hypothesis, social phobics showed interference for social but not for physical threat words, and the reverse was true for the panic patients. Thus patients showed attentional biases only for disorder-relevant information. Similarly, Mathews and Sebastian (1993, Exp. 2) found that snake-avoidant participants showed more interference in the emotional Stroop for snake-relevant than for general threat words. Related studies found greater interference for words associated with combat for Vietnam veterans with PTSD (McNally et al., 1990), for contamination words in OCD patients (Tata et al., 1996), and for spider-related words in spider phobics (Watts, McKenna, Sharrock, & Trezise, 1986). Thus, across a wide range of anxiety disorders, semantic relatedness or specificity of experimental material to participants' disorders and concerns have been proven to be an important factor. Overall, combining the two issues of emotionality and specificity, it appears that emotionally disordered individuals generally tend to be particularly vigilant to materials that are related to both the content and the valence of their worries and concerns.

Do Attentional Biases Occur in Recovered Patients?

Studies that assessed recovered anxiety-disordered patients have generally (but not always) found that an attentional bias which was present before treatment disappeared after successful treatment. This has been shown in GAD (e.g., Mathews, Mogg, Kentish, & Eysenck, 1995), OCD (Foa & McNally, 1986), spider phobia (Watts et al., 1986; although see also Thorpe & Salkovskis, 1997), and social phobia (Mattia, Heimberg, & Hope, 1993). For example, one study of GAD patients showed both subliminal and supraliminal Stroop interference for negative words relative to controls, but immediately after successful treatment and at 20-month follow-up interference in both conditions was gone (Mogg, Bradley, Millar, & White, 1995). In addition, the magnitude of decreased interference after treatment in the recovered patients correlated with reduced ratings of anxious thoughts. Similarly, using a supraliminal version of the dot-probe task, Mogg, Mathews, and Eysenck (1992) showed that GAD patients, but not recovered patients, were faster to detect probes in the location of the threatening words.

Are Attentional Biases State or Trait Effects or Do They Interact?

Another important issue concerning the nature of anxiety-related attentional biases is whether they are associated with trait (i.e., stable) or state (i.e., transient) aspects of emotions. Early studies that used questionnaires such as the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) yielded mixed results (e.g., Broadbent & Broadbent, 1988; Mathews & MacLeod, 1985; Mogg, Mathews, & Weinman, 1989). Perhaps more interesting questions are raised by studies that have manipulated state anxiety to determine how it interacts with trait anxiety. Different types of stressors have been used to manipulate anxiety, either by experimentally inducing it (e.g., giving participants unsolvable anagrams or placing their feared objects/situations in close proximity) or by tapping naturally occurring mood (e.g., testing before end-of-the-semester examinations). Three different kinds of stressors have been used: (1) acute stressors not directly relevant to the participants' concerns; (2) acute stressors that are directly and immediately relevant to the participants' concerns; and (3) more long-term naturally occurring stressors that are quite relevant to the participants' concerns.

Regarding acute stressors not directly relevant to participants' concerns, two studies manipulated state anxiety levels by giving high- and low-trait-anxious participants very difficult and unsolvable (high stress) or easy (low stress) anagrams to solve (Mogg, Mathews, Bird, & Macgregor-Morris, 1990). The emotional Stroop (Study 1) or the dot-probe task (Study 2) were administered after this mood induction procedure. Under high stress (and elevated state anxiety), both high- and low-trait-anxious groups showed color-naming interference and facilitated dot-probe detection for threatening words. Thus, with this kind of stressor, state and trait anxiety may operate independently.

Other studies used stress-induction manipulations which were acute but also more immediately and intensely related to participants' fears than was the stress in Mogg et al.'s (1990) study. In one such study, Mathews and Sebastian (1993, Exp. 1) used the presence of a snake in the testing room as a means of mood induction for students who were high and low on fear of snakes. To maintain high-state anxiety, students were told that after the Stroop task they would be asked to try to touch the snake. Results indicated that neither group showed color-naming interference for snake-related words relative to neutral categorized words. However, when the snake was not present (Mathews & Sebastian, 1993, Exp. 2), the anticipated color-naming interference for threatening stimuli in the snake-

fearful group did occur. Another study replicated this suppression-of-interference effect in social phobics whose state anxiety was manipulated by telling them that they would have to give a speech that would be taped (Amir, McNally, Riemann, Burns et al., 1996). Thus J. M. G. Williams et al. (1996) suggested that, under stressful conditions in which the source of stress is obvious and immediately relevant to participants' concerns, anxious participants may increase their conscious efforts to avoid attending to the threatening words, thereby overriding their attentional bias.

Finally, a study that used a naturally occurring stress manipulation found an interesting interaction effect between trait and state anxiety (C. MacLeod & Rutherford, 1992). In this study, when levels of state anxiety were low (early in the semester), students both high and low in trait anxiety did not show color-naming interference for negative versus positive exam-related words presented subliminally. However, in the week prior to end-of-semester exams, when state anxiety levels were elevated for both groups, high-trait-anxious students did show an increased subliminal interference effect for threat words, whereas low-trait-anxiety students showed an opposite effect, a color-naming facilitation for negative words (i.e., avoidance of threat).[2] C. MacLeod and Mathews (1988) had found similar results using a supraliminal version of the dot-probe paradigm. In light of these findings, J. M. G. Williams and colleagues (1996, 1997) suggested that an interaction between trait and state anxiety tends to occur only in cases in which the heightened levels of state anxiety have "time to incubate" (e.g., when anticipating an exam; J. M. G. Williams et al., 1997, p. 98) and not when it is short-lived. Thus the nature of the mood manipulation must be taken into account when interpreting results of such studies.

In summary, accumulated findings from studies that used various methods of mood manipulations show that either or both trait and state anxiety, or the interaction between the two, may have an influence on the presence of anxiety-related attentional biases, although not in an easy, straightforward manner. With laboratory stressors not immediately related to participants' concerns, high experimental stress produces attentional biases in both high- and low-trait-anxious participants (Mogg et al., 1990). In contrast, when long-term naturally occurring stressors that are relevant to the participants' concerns are used, high trait anxiety interacts with high state anxiety to provide an increased interference effect for subliminally presented threat words (e.g., C. MacLeod & Rutherford, 1992; but see also C. MacLeod & Mathews, 1988, for similar effects with supraliminal conditions). By further contrast, when the nature of the stressor is immediately and imminently relevant to worries or fears of the participants being tested and participants are consciously aware of the content of the presented stimuli, high levels of state anxiety appear to actually suppress the occurrence of attentional biases (e.g., Amir, McNally, Riemann, Burns, et al., 1996; Mathews & Sebastian, 1993; see also C. MacLeod & Rutherford's, 1992, supraliminal results with a long-term type of stressor). Thus, although the pattern is somewhat complex and there are issues that are yet unresolved (e.g., whether some of the findings are confined only to automatic versus strategic biases), the findings of these studies are actually reasonably consistent.

Attentional Biases in Depression

In contrast to the relatively robust results that indicate the presence of an attentional bias in anxiety and anxiety disorders, evidence in support of a similar bias in depression is much less consistent. In an early study, Gotlib and McCann (1984) used the emotional Stroop and showed that mildly depressed (dysphoric) students were slower in naming the colors of negative words than of neutral or positive words. However, it should be noted that these dysphoric and nondysphoric students undoubtedly also differed on levels of anxiety, a difference which could account for the results. Moreover, results of later studies, some using clinically diagnosed participants, were quite inconsistent: Some failed to find evidence for an attentional bias in depression (e.g., Mogg, Bradley, et al., 1993), whereas others did find such evidence (e.g., Mogg, Bradley, & Williams, 1995; Segal, Gemar, Truchon, & Guirguis, 1995). When such biases have been found, they seem to disappear when the depression remits (e.g., Gotlib & Cane, 1987; Segal & Gemar, 1997).

Yet another pattern of bias was observed by Gotlib, McLachlan, and Katz (1988). In a study using a modified dot-probe task, mildly depressed individuals attended equally to positive and negative words (i.e., an even-handed bias), whereas nondepressed participants showed an attentional bias toward the positive stimuli. However, another study of subclinically anxious and depressed individuals that used a very similar paradigm indicated that anxiety might actually be responsible for this effect (Mogg et al., 1991). Further complicating the picture, a more recent study using the dot-probe paradigm found that depressed participants did show selective attention to socially threatening words, although only when the words were presented supraliminally (Mathews, Ridgeway, & Williamson, 1996). Thus the pattern of findings with depression is decidedly inconsistent, and most studies have not been able to rule out the possibility that the biases sometimes observed may be a function of the elevated anxiety seen in depressed patients.

Automatic Versus Strategic Biases?

A number of studies that have examined the automatic versus strategic issue have reported mixed results. One

such study found that only anxiety and not depression was associated with supraliminal biases (Mogg, Bradley, et al., 1993), whereas in another study (Mogg, Bradley, & Williams, 1995) both anxious and depressed groups, relative to controls, showed attentional biases toward the negative words that were presented supraliminally. Similarly, an even more recent study found that induced dysphoric mood resulted in supraliminal but not subliminal attentional bias using the dot-probe task (see also Mathews et al., 1996), whereas high trait anxiety was associated only with the subliminal bias (Bradley, Mogg, & Lee, 1997). Interestingly, when anxiety (GAD) was comorbid with depression, the depression seemed to eliminate the usually observed bias seen with anxiety in a subliminal condition (Bradley, Mogg, Millar, & White, 1995). Overall, although some studies have found evidence for an attentional bias in depression using supraliminal (but not subliminal) presentations, the results are not entirely consistent.

One plausible explanation for at least some of the inconsistencies in the literature discussed thus far on attentional biases in depression may be that measures of depression and anxiety tend to be poor at discriminating these two disorders (e.g., the very high correlations between measures such as the Beck Depression Inventory [BDI] and the Beck Anxiety Inventory [BAI]; Watson et al., 1995). Thus, as noted earlier, it is possible that many of the effects seen in depressed patients were actually due to their high anxiety levels. Moreover, it is important to note that this problem is not merely psychometric. Depression tends to co-occur with various anxiety disorders, and in general depressed patients show high levels of anxious symptomatology, but the reverse is not necessarily true (for a recent review of the comorbidity between anxiety and depression, see Mineka, Watson, & Clark, 1998). Although one study previously mentioned found that comorbid depression seems to suppress at least preconscious attentional biases in anxiety (Bradley et al., 1995), in general this complex issue is still far from being understood. What is it, for example, about depressive symptoms that sometimes seems to mask or suppress attentional biases for threat, despite the fact that depressed participants show as high or higher levels of anxious symptoms than anxious participants (e.g., Bradley, Mogg, Millar, & White, 1995; Mogg, Bradley, et al., 1993)?

The Emotionality and Specificity of Experimental Stimuli

One study on the emotionality and specificity issue in depression found Stroop interference effects for all negative stimuli (whether related to participant's concerns or not), but interference did not occur with positive stimuli (Nunn, Mathews, & Trower, 1997). In an interesting study, Segal and colleagues (Segal et al., 1995) asked depressed and nondepressed control participants to select self-descriptive negative and positive adjectives. Later, participants were tested using a version of the emotional Stroop in which (in order to activate their self-schemata) every word was primed by a positive (e.g., "able to feel close") or negative (e.g., "I often feel judged") short phrase that had been previously rated by the participants as self-descriptive or not. Results indicated that depressed participants showed longer color-naming latencies for self-descriptive negative words that were primed by negative self-phrases than for any other combination. In addition, the depressed group showed greater interference for all negative (even non–self-descriptive) than for positive words, whereas the nondepressed group did not show any interference effect whatsoever.

In summary, findings of attentional bias in depression are decidedly more mixed than in anxiety and the anxiety disorders. Using both Stroop interference and dot-probe paradigms, attentional bias has been observed in some studies but not others and observed quite clearly only with supraliminal presentations of negative words.

In summary, numerous studies in the past two decades using cognitive paradigms, such as the emotional Stroop and the dot probe, have shown that emotional disorders are often associated with attentional biases for mood-congruent material. It is well established that anxiety-disordered individuals show these biases, particularly to negatively valenced stimuli that are related to their fears and concerns. High-trait-anxious participants, with or without laboratory-induced state anxiety, clearly show attentional biases in some (but not in all) studies, with effects depending on a number of factors, such as the nature of the stressors and whether the task is subliminal or supraliminal. By contrast, the existence of these biases in depressed populations is not as clear. As is discussed later, a number of models have been recently suggested as possible frameworks for explanation of this pattern of mood-congruent attentional biases (e.g., Mogg & Bradley, 1998; J. M. G. Williams et al., 1997; see section on "Theories of Information Processing and the Emotional Disorders," this chapter).

Memory Biases

Given that some attentional processing of material (however brief or cursory) generally must occur before the material can be remembered, one might expect that individuals who show attentional biases for emotion-relevant material might be likely to show especially good memory for the same kind of material. Moreover, the two most prominent theories of the effects of emotion on information processing—Bower's semantic associative network theory (e.g., 1981) and Beck's schema theory (e.g., 1967, 1976)—predict that both anxiety and depression should produce generally the same effects on attention and mem-

ory for emotion-relevant material. However, the picture that has emerged from research over the past 15 to 20 years is far more complicated.

Mood-congruent memory is said to occur when depressed or anxious individuals remember previously presented material better if that material is congruent with their mood or emotional state. Sometimes mood affects which material is encoded in the first place (mood-congruent processing), and sometimes it affects which material is retrieved (mood-congruent retrieval). Mood-congruent memory should not be confused with *mood-dependent memory*, in which any material (neutral or emotional) learned while in one mood is best recalled when in the same mood (see Ellis & Moore, 1999, for a discussion of these distinctions). For the present purposes we focus on mood-congruent memory, by which, typically, a depressed individual exposed to neutral, negative, and positive material would later remember more negative than neutral or positive material, whereas a nondepressed individual would often remember more positive than negative material.[3]

In this section we consider several different issues that have been studied in this area. The first issue is the type of memory being assessed. Until the past 15 to 20 years, most memory studies were of *explicit memory* (e.g., free recall, cued recall, or recognition), in which participants are instructed to consciously retrieve previously studied material through one of these methods. More recently attention has focused increasingly on *implicit memory* research, in which memory is assessed indirectly by, for example, comparing the performance of participants on various implicit tasks that involve either previously presented material or new material. Much of the renewed interest in this topic has stemmed from extensive research on amnesic patients who show severe deficits on explicit memory tests but relatively normal performance on tests of implicit memory (e.g., Roediger, 1990; Schacter, 1987). Paralleling this more recent focus on general implicit memory has been increased interest in mood-congruent implicit memory. In contrast to explicit memory tasks, performance on implicit memory tasks is not influenced by volitional strategies and is unconscious in nature (C. MacLeod & Rutherford, 1999). Evidence for mood-congruent implicit memory might give us one possible reason that negative memories so often come to mind in individuals with emotional disorders without their having made any attempt to retrieve those memories.

A second issue concerns whether any biases shown are vulnerability or state markers. That is, do they exist as vulnerability factors prior to and/or following a depressive episode? Finally, another issue in studies of autobiographical memory is whether differences in retrieval for positive versus negative memories are simply a function of possible real differences in past experiences, as opposed to current mood state.

Depression

Explicit Memory Biases with Experimentally Presented Material. Mood-congruent memory studies in depression involve comparing depressed and nondepressed individuals on their memories for either autobiographical or experimentally presented material of several valences (usually negative with neutral and/or positive). With experimentally presented material, participants are usually asked to encode the material with a self-referential encoding task (e.g., asking the person to create a visual scene associating the presented word with him- or herself or to rate how well the word describes him or her). Researchers have generally found that clinically depressed patients show a bias to recall experimentally presented negative, especially self-referential, information. (This bias appears to be lower in magnitude when the material is not encoded in a self-referential manner, primarily because it is not as elaboratively encoded in non–self-referential encoding tasks; see Teasdale & Barnard, 1993.) Nondepressed controls tend to favor recall of positive material. Dysphoric participants tend to show even-handed memory, recalling approximately equal amounts of negative and positive information (see J. M. G. Williams et al., 1997; see also Matt, Vacquez, & Campbell, 1992, for a meta-analysis.)

Next we turn to some of the more important parameters that influence mood-congruent memory biases in depression. Although this topic has not been as extensively studied for memory biases as for attentional biases, some studies have suggested that these explicit memory biases associated with depression seem to occur primarily with depression-relevant words (vs. threat words, for example; cf. Bellew & Hill, 1990; Bradley, Mogg, & Williams, 1994; Watkins, Mathews, Williamson, & Uller, 1992). Regarding the issue of whether such memory biases are a vulnerability factor or a state marker of depression, several studies have compared depressed, previously depressed, and normal control individuals to determine whether the bias remits following recovery. Although the results are not entirely consistent here, a number of studies have shown that these negative memory biases may not completely remit along with remission from depression. The lingering negative memory bias is especially evident when previously depressed individuals are given a negative mood induction (e.g., Bradley & Mathews, 1988; Gilboa & Gotlib, 1997; Hedlund & Rude, 1995; Teasdale & Dent, 1987). Several studies have also shown that individual differences in the tendency for negative memory biases may precede and predict onset of a depressive episode (e.g., Bellew & Hill, 1991) or susceptibility to a depressive mood induction procedure (Bellew & Hill, 1990). Such studies support the idea that negative memory biases may be an enduring marker of vulnerability to depression (at least when in a depressed mood), preceding its onset and lasting into recovery.

Autobiographical Memory Biases. Several different ways of studying autobiographical memory biases have been successfully employed in this literature. For example, some studies have examined the content of the autobiographically recalled memories to determine whether there are differences in the specificity versus overgenerality of the positive and negative memories recalled. Overgeneral memories do not include reference to specific times or places (e.g., responding with "whenever I played soccer" vs. "when I played soccer last Sunday" to the cue word "fun"; e.g., J. M. G. Williams et al., 1997). Several studies (e.g., Moffitt, Singer, Nelligan, Carlson, & Vyse, 1994; M. Williams & Scott, 1988) have found that depressed patients retrieve less specific (i.e., overgeneral) positive memories than nondepressed controls (and sometimes less specific negative memories, too; cf. Kuyken & Dalgleish, 1995; Moore, Watts, & Williams, 1988). Thus at present it is not entirely clear whether the depressive bias toward overgeneral memories is specific to positive or also includes negative memories.

Using a different method that is not focused on content differences, depressed and nondepressed participants are sometimes asked to retrieve specific autobiographical positive and/or negative memories to neutral cue words (or to retrieve autobiographical memories to positive and negative cue words). In these paradigms, the number of these recalled memories and the latency to recall them is recorded. Typically what is found is that depressed individuals, but not normal controls, take longer to recall positive memories (even to positive cue words). Moreover, some studies have also found that the more severe the depression, the more quickly the depressed patient retrieves an unpleasant memory (e.g., Lloyd & Lishman, 1975; see Healy & Williams, 1999, and J. M. G. Williams et al., 1997, for reviews).

Do these differences in autobiographical memories occur because depressed people have simply experienced more negative events than nondepressed people? To examine this question, several studies have tested participants on multiple occasions and in different affective states. If the "different experiences" hypothesis is correct, then people should show the same pattern of recall whether they are currently depressed or nondepressed. In one ingenious study, D. M. Clark and Teasdale (1982) recruited depressed patients who showed significant diurnal variation in mood and studied them at several different points in their day. As the participants' depression level increased, the probability of their recalling a negative autobiographical memory also increased (and decreased for positive memories). As they became less depressed, the opposite occurred; thus the different-experiences hypothesis was not supported. Rather, these results suggest that it is the current affective state that drives these biases. Other studies of normals with induced depressed or positive moods also show an effect of mood on autobiographical memory, even when past experience is clearly controlled (e.g., Gilligan & Bower, 1984; Teasdale & Fogarty, 1979).

A third technique for studying a specific kind of autobiographical memory bias has also been developed in recent years. Brewin and colleagues, in a series of studies, have shown that depressed patients, such as those with PTSD, have a higher than expected level of *intrusive memories* for negative events. Intrusive memories are measured at the end of a detailed interview that assesses a series of stressful events that may have occurred in the patient's life. After these events have been recorded, patients are asked if they had noticed any of these stressful life events spontaneously coming to mind in the past week. "To qualify, memories had to consist of a visual image of a specific scene that had actually taken place. General thoughts or worries were not included" (Brewin, Reynolds, & Tata, 1999, p. 513). Intrusive memories occurred in depressed patients nearly as much as in PTSD patients, and there were no differences in attempts to avoid or suppress them. Differences did occur, however, in the typical content of the intrusive memories: family deaths, illness, and interpersonal events for depression patients versus personal assault or illness for PTSD patients (Reynolds & Brewin, 1999). In addition, for the depressed group a combined measure of the presence and extent of intrusive memories predicted depression levels 6 months later, even when controlling for Time 1 depression level.

Teasdale (1988) and others have argued that these memory biases for negative self-referential or autobiographical material, in combination with interpretive and judgmental biases (to be discussed briefly later), can be seen as creating what Teasdale calls a vicious cycle of depression. He argues that if one is already depressed and if his or her memory is biased to recall negative things that have happened, these biases help perpetuate the depression. Consistent with this idea are findings by Dent and Teasdale (1988). They found that, for depressed patients, the number of negative trait words the patients had previously rated as self-descriptive was highly correlated ($r = .8$) with the number of such words they recalled on an incidental recall task and that both of these predicted how depressed the patients would be five months later (even when controlling for initial depression). Indeed, this was the only predictor variable other than initial level of depression to predict depression significantly at this later point. Brittlebank, Scott, Williams, and Perrier (1993) also found that the extent of overgeneralization of their positive memories recalled in an autobiographical memory task in depressed inpatients at Time 1 was the single best predictor of depression three and seven months later.

Implicit Memory. Another issue in mood-congruent memory research is whether any such biases occur with implicit, as well as explicit, memory tasks. Implicit memory

in depression is generally assessed by exposing depressed and nondepressed participants to negative and neutral information. Participants' memories are assessed indirectly in a later task by comparing their performance on that task with previously presented versus new information (the priming or implicit memory index). An implicit memory bias for negative information would result in a higher priming index for the depressed participants with previously presented negative words than with previously presented neutral words. The first three published studies with depressed patients on this topic found no significant evidence for an implicit mood-congruent memory bias (although all three replicated the standard explicit mood-congruency effects; Denny & Hunt, 1992; Hertel & Hardin, 1990; Watkins et al., 1992; see Roediger & McDermott, 1992, for a review and commentary).

However, in their commentary on several of these studies, Roediger and McDermott (1992) proposed that those studies were inconclusive regarding possible implicit memory biases because there had been a mismatch between the nature of the encoding task and the nature of the mood-congruent implicit memory task. The cognitive processes involved in such tasks can be either data-driven/perceptual (e.g., focusing on the physical characteristics of the word, such as the number of letters), or conceptual (e.g., elaborating or focusing on the meaning of the word). For memory in general, Roediger and colleagues have hypothesized and found that the greater the overlap between the processes used during the encoding and the memory tasks (e.g., perceptual-perceptual or conceptual-conceptual), the better the memory performance on a particular task (e.g., Roediger & Blaxton, 1987). Accordingly, Watkins, Vache, Verney, Muller, and Mathews (1996) used an implicit memory task that met these requirements (conceptually based encoding and memory tasks) and found the hypothesized mood-congruent implicit memory bias for depression-relevant words (and an opposite bias in controls, who showed more priming for positive words than for negative words). Moreover, four separate experiments using a different kind of conceptual implicit memory task (primed lexical decision; Bradley, Mogg, & Williams, 1994, 1995; Bradley, Mogg, & Millar, 1996) also found evidence for an implicit memory bias for negative words in dysphoric and clinically depressed patients, and the effects were clearly a function of their depression rather than of anxiety (see the next section; see also Ruiz-Caballero & Gonzalez, 1994). Mood-congruent implicit memory biases are of particular interest because they suggest one possible explanation for the fact that negative information so often enters the consciousness of depressed individuals without their making any conscious effort to recall it.

As this section indicates, there is a great deal of evidence for explicit memory biases for negative mood-congruent information in depression, although the absolute magnitude of this bias is usually rather small; Matt et al., (1992) reported that clinically depressed participants tended to recall approximately 10% more negative than positive material. Nondepressed participants generally recall more positive than negative material (by about 8%). In autobiographical memory, it seems that the bias seen in depressed individuals most likely reflects current differences in emotional state rather than differences in experiences. Finally, at least six recent studies have also found good evidence for a mood-congruent implicit memory bias for negative information in depression.

Anxiety and Anxiety Disorders

In contrast to the strong evidence for mood-congruent memory biases in depression, the research examining whether such biases for threatening information exist with anxiety and anxiety disorders is much more mixed. Very few studies claim to find evidence for explicit memory biases in anxiety, and results for implicit memory biases are somewhat inconsistent. The results for generalized or high trait anxiety are discussed separately from those in other anxiety disorders, as the emerging picture in the latter case is somewhat more complicated.

Explicit Memory. Most explicit memory studies on clinically anxious or high-trait-anxious participants have found no significant memory biases for threatening versus neutral information. Indeed, several have even found a trend toward the opposite bias (e.g., Mogg, Mathews, & Weinman, 1987). Most typical, however, are simply findings of no differences between groups on explicit recall (or recognition) of threatening versus neutral information (e.g., Bradley, Mogg, & Williams, 1995; Mathews, Mogg, May, & Eysenck, 1989; Mogg, 1988; Mogg et al., 1992; Nugent & Mineka, 1994). J. M. G. Williams et al. (1997) summarized this literature by noting that at the time of their review, only 5 out of 16 studies that examined explicit memory biases in high trait anxiety or GAD showed any evidence for such a bias; they further noted that of these five, the results of three provided only very weak support for such a bias (see also Becker, Roth, Andrich, & Margraf, 1999). Given the strong bias toward publishing positive rather than negative results, we are not confident that a reliable explicit memory bias in anxiety will be found. One possible explanation of such results, which we detail later, is that although highly anxious participants clearly show heightened vigilance for threat, once their attention is drawn to it, they may avoid further elaborative rehearsal that would be necessary to produce concomitant explicit memory biases (M. Williams et al., 1988; J. M. G. Williams et al., 1997).

Autobiographical Memory. Regarding autobiographical memory biases in anxiety, two studies, using paradigms similar to those used with depression, suggested that anxious participants may show superior autobiographical memory biases for threatening material (Burke & Mathews, 1992; Richards & Whittaker, 1990, using GAD patients and high-trait-anxious participants, respectively). However, one study of high-trait-anxious participants failed to replicate these results with a design that was in some ways superior to the other two (Levy & Mineka, 1998), leaving the status of an autobiographical memory bias in anxiety uncertain. Moreover, no studies to date have examined whether any such effects that may exist are due to differential experiences with threatening events or to differential encoding (by anxious participants) of more ambiguous events as highly threatening (see the subsequent section, "Judgmental or Interpretive Biases").

Implicit Memory. As in the studies of mood-congruent memory in depression, implicit memory in anxiety is generally assessed by exposing anxious and nonanxious participants to threatening and neutral words. Participants' memories are assessed indirectly in a later task by comparing their performance with threatening versus neutral words that are either new or previously presented (the priming or implicit memory index). Mathews, Mogg, May, & Eysenck (1989) first reported results that suggested that GAD patients may show a relative bias in implicit (but not explicit) memory for threatening information. Since then, however, the picture that has emerged is very mixed. On the one hand, one study did report a significant implicit memory bias in GAD patients using a perceptual identification task (C. MacLeod & McLaughlin, 1995), although the researchers did not rule out the possibility that depression could be mediating the bias (cf. Bradley et al., 1996). Moreover, Eysenck and Byrne (1994) also found such a bias in high-trait-anxious participants with an implicit memory task chosen to involve the same kind of processing at encoding and at the indirect memory test, although again whether this bias was due to depression rather than anxiety was unclear. On the other hand, Mathews himself reported a failure to replicate his earlier finding with GAD patients (Mathews et al., 1995); however, a slightly different paradigm was used that in retrospect might be less likely to result in such a bias (see Roediger & McDermott, 1992). In addition, Nugent and Mineka (1994) failed to find evidence in two studies for such a bias in high-trait-anxious individuals (whose levels of trait anxiety were comparable to those of the GAD patients in the Mathews, Mogg, May, & Eysenck 1989, study). Four subsequent studies also failed to produce such an effect in high-trait-anxious individuals, even when both conceptual encoding and implicit memory tasks were used (Mineka, 1997, unpublished data). Finally, perhaps the single most important study in this area was conducted by Bradley et al. (1995). They compared the performance of GAD patients with that of depressed patients and normal controls on implicit and explicit memory tasks and found no evidence of either implicit or explicit memory biases in anxiety (although both biases were present in depression). Thus, although Williams et al. (1997) concluded that the bulk of the evidence supported the existence of implicit memory biases in anxiety, we differ in our conclusions and see the emerging picture as decidedly inconsistent.[4]

Overall, the pattern of largely negative findings for anxiety—using a range of paradigms—stands in rather striking contrast to the positive findings seen with depression. Especially important in this regard are studies such as that of Bradley, Mogg, and Williams (1995), which directly compared depressed and anxious participants using both depression- and anxiety-relevant words and both implicit and explicit memory tasks. Such studies are ideal because, when they reveal such biases in depression but not anxiety, we are quite certain that the paradigm is sensitive for demonstrating such differences. Nevertheless, more work is needed to try to determine whether there are particular conditions under which implicit memory biases in anxiety can be found reliable.

Memory Biases in Other Anxiety Disorders

As noted earlier, the status of possible memory biases in other anxiety disorders is somewhat more complex than for general anxiety. Moreover, because fewer studies have been done, the degree of confidence that we can place in any conclusions we draw is somewhat lower. Additionally, many of the studies that claim to find such biases have either failed to or been unable to rule out the possibility that the biases seen could be a function of the clinical participants' elevated levels of depression rather than their anxiety.

Specific Phobias. Starting with specific phobias, Watts, Sharrock, and Trezise (1986) and Watts and Dalgleish (1991) found that spider phobics demonstrated poorer explicit memory for spiders than did controls (dead spiders were mounted on cards). However, Watts and Coyle (1993) did not replicate their earlier findings of inferior memory in spider phobics when spider words were used, but their results also lent only weak support to the idea of a memory bias for spider words. Moreover, Rusted and Dighton (1991) found that spider phobics showed enhanced recall for prose material related to spiders (e.g., a story about a visit to an old house with an empty garage and lots of cobwebs) but not involving direct reference to them. This seemingly opposite effect may have occurred because the

spider phobics did not have to encode or recall details of spiders per se (as they did in the three Watts studies); phobics may be reluctant to respond with objects that they fear (see J. M. G. Williams et al., 1997). Finally, we found only one study that examined whether implicit memory biases occur in specific phobia. Using analogue participants who were fearful of insects, Harris, Adams, Menzies, and Hayes (1995) found evidence for an implicit bias (but no explicit bias) for insect pictures. Such findings obviously need to be replicated with real phobic participants, however, before much confidence can be placed in them.

Social Phobia. At least four studies have found no evidence that demonstrates an explicit memory bias in social phobia for threatening material (see Becker et al., 1999, for a review). One additional study using a very different paradigm did find evidence of a recognition bias for previously presented photographs of critical, relative to neutral, faces (Lundh & Öst, 1996), although this study suffers from several methodological limitations (cf. C. MacLeod, 1999). In another study, a subset of socially phobic participants (those with specific social fears) did show an implicit memory bias for socially threatening material (Lundh & Öst, 1997). Thus, although the number of studies is not yet large enough to be conclusive, the evidence suggests that mood-congruent memory biases in social phobia are certainly not robust.

Obsessive-Compulsive Disorder. One study that examined autobiographical memory in OCD found that OCD patients had overgeneralized memories in response to cue words but that the effects were not a function of OCD per se but rather of their comorbid diagnoses of depression (Wilhelm, McNally, Baer, & Florin, 1997). Another study found no evidence for either an implicit or explicit memory bias in OCD patients for OCD-relevant material compared with controls (Foa, Amir, Gershuny, Molnar, & Kozak, 1997).

Posttraumatic Stress Disorder. Only a few memory bias studies on PTSD exist, and they show somewhat mixed results. For example, one study that used a conceptual memory task found better implicit memory for combat-relevant sentences in PTSD patients (Amir, McNally, & Wiegartz, 1996), whereas another that used a perceptual memory task failed to find such an effect (McNally & Amir, 1996). These findings suggest the possibility that the type of memory task may influence the results, which would not be surprising given the points mentioned earlier by Roediger and McDermott (1992).

In studies of autobiographical memory, overgeneralized memories were found in several studies of PTSD patients (McNally, Litz, & Prassas, 1994; McNally, Lasko, Macklin, & Pitman, 1995). These studies also found evidence of a more traditional autobiographical memory bias for negative memories, although it is quite possible that this occurred simply because patients had experienced more negative events. Moreover, intrusive memories, such as were discussed previously with regard to depression, are of course a hallmark of PTSD but quite clearly must be a function of differential experiences (e.g., Reynolds & Brewin, 1999).

Panic Disorder. In contrast to studies of the anxiety disorders reviewed previously, the picture seems somewhat more consistent with panic disorder, suggesting that explicit memory biases for threat may be a special feature of this condition. However, questions about whether this bias is truly a function of panic disorder remain. Seven out of at least eight studies found some evidence of an explicit memory bias for threatening information in panic disorder (see C. MacLeod, 1999, for a review of seven of these; see also Becker et al., 1999). However, in one study the bias was found only in patients who showed laterality scores that favored left-hemisphere processing (Otto, McNally, Pollack, Chen, & Rosenbaum, 1994), and in another the authors showed that some of the results were due more to the high levels of depressive symptoms than anxiety symptoms seen in their panic-disordered patients (Becker et al., 1999). Several other of these studies also did not rule out the possibility that the bias could be a function of elevated depression levels. Thus, although explicit memory biases do seem to occur in panic disorder, the possibility remains that such biases may be due to elevated levels of depression.

Studies on implicit memory biases in panic disorder have been inconsistent. Two have claimed to find such a bias (Amir, McNally, Riemann, & Clements, 1996; Cloitre, Shear, Cancienne, & Zeitlin, 1994), but the former one found bias on only one of three dependent measures, and the latter used a somewhat unconventional implicit memory task. Moreover, two other studies failed to find such a bias (Becker, Rinck, & Margraf, 1994; Lundh & Öst, 1997).

Overall, the pattern of results regarding mood-congruent memory biases in the other anxiety disorders is somewhat inconsistent, with the most consistent evidence for explicit memory biases existing for panic disorder, although even in these cases it is not as yet entirely clear what role depression plays in mediating these biases. Some studies of some disorders have found evidence of an implicit memory bias, but many have not. Given the bias against publishing null results, one can only conclude that the evidence for such biases is rather inconsistent at the present time. Autobiographical memory biases have been studied extensively only for PTSD and have not ruled out the different-experience hypothesis to explain positive results. Overgeneralized autobiographical memory, however, does appear to occur in PTSD, and current speculations are that a style of overgeneralized memory

(even for neutral events) may arise as a response to the experience of trauma (Healy & Williams, 1999; J. M. G. Williams et al., 1997).

Judgmental or Interpretive Biases

Both anxiety and depression are associated with several forms of judgmental and interpretive biases. Some of the research on these biases involves subjective estimates of the probability of future events (positive and negative); other work involves sophisticated information processing paradigms to determine whether these disorders are associated with biased interpretations of ambiguity.

Probability Judgments of Future Events

As reviewed by A. MacLeod (1999), numerous studies that have examined subjective probability judgments about future events have found that depressed and anxious individuals judge negative future events as more likely to happen to them than do controls. There is also a tendency for depressed (and perhaps anxious) individuals to show a reduced perceived likelihood of future positive events (although results here are less consistent). Unfortunately, it is impossible to determine in any absolute sense how realistic such biases may be, given that people vulnerable to depression are known actually to experience more stressful life events (e.g., Kendler, Neale, Kessler, Heath, & Eaves, 1993). MacLeod's own research supports the idea that heightened anticipation of future negative experiences is associated with the general factor of negative affect (nonspecific to both depression and anxiety), whereas the other general factor of low positive affect (specific to depression) is associated with the reduced anticipation of future positive experiences (e.g., A. MacLeod & Byrne, 1996). In addition to a biased forecast of future probabilities, anxious patients generate more numerous different negative (but not positive) future events that are going to happen to them, whereas depressed patients have difficulty generating different positive (but not negative) future events (A. MacLeod, Tata, Kentish, & Jacobsen, 1997). Additionally, Byrne and MacLeod (1997) found that anxious and anxious/depressed participants generated more explanations than did control participants for why future positive outcomes would not, and future negative outcomes would, happen.

A. MacLeod (1999) discusses evidence for mechanisms that possibly underlie these biased future-related cognitions. First, invoking Tversky and Kahneman's (1973) availability heuristic, he suggests that anxious and depressed individuals have easier access to negative (but not positive) memories or cognitive content. Second, invoking Kahneman and Tversky's (1982) simulation heuristic, MacLeod suggests that emotionally disordered individuals may differ in their simulation processes for future events. Specifically, this implies that an active process of delineating the actual steps or subgoals that will precede a future event is at the root of the probability with which that event will be forecast. Given that anxious and depressed individuals can generate many reasons why negative events will, and positive events will not, happen to them, this may explain why they overestimate their occurrence.

Interpretation of Ambiguity

In self-report studies, individuals with emotional disorders show a tendency to interpret ambiguous events negatively. For example, Butler and Mathews (1983) found that both depressed and anxious patients were more likely to interpret ambiguous scenarios in a threatening manner (e.g., "Suppose you wake with a start in the middle of the night thinking you heard a noise, but all is quiet. What do you suppose woke you up?"; J. M. G. Williams et al., 1997, p. 228). Similar findings were obtained with panic patients and agoraphobics (e.g., D. M. Clark, 1988; McNally & Foa, 1987).

Unfortunately, with self-report measures it is difficult to determine whether patients simply have a negative response bias, prompting investigators to use other less problematic paradigms. Nearly all of these studies have used anxious populations. Biased interpretations of ambiguity have been shown to occur both with ambiguous homophones (e.g., *die/dye, pain/pane*; Mathews, Richards, & Eysenck, 1989) and with ambiguous sentences (e.g., "the doctor examined Little Emma's growth" or "they discussed the priest's convictions"; e.g., Eysenck, Mogg, May, Richards, & Mathews, 1991).[5] One very elegant study involved a text comprehension paradigm (C. MacLeod & Cohen, 1993). Results clearly showed that these interpretive biases were occurring while the anxious individuals were reading the text (on-line) rather than afterward, in which case a memory bias could potentially have contributed to the effect in the Eysenck et al. (1991) study (see also Calvo, Eysenck, & Castillo, 1997; Calvo, Eysenck, & Estevaz, 1997).

These issues have not been studied in depression, except with self-report, for reasons that are unclear. In the only study we are aware of that examined interpretation of ambiguity with a priming methodology, Lawson and MacLeod (1999) found no evidence for such a bias in mildly depressed college students. However, such results clearly need to be replicated with clinically depressed samples to determine how reliable they are.

Judgments of Covariation

Phobic fears also seem to be the basis for biased judgments of the covariation between feared stimuli and aversive outcomes. Tomarken, Mineka, and Cook (1989) exposed high or low snake-fearful participants to a series of slides of fear-relevant (snakes) and fear-irrelevant (flowers and

mushrooms) stimuli, each of which was followed by an aversive or nonaversive outcome (shocks, tones, or nothing). Slide categories and outcomes were paired an equal number of times. Yet when asked to judge the probability that each slide category had been followed by each outcome type, high-fear participants dramatically overestimated the percentage of trials on which the fear-relevant stimuli had been followed by shock but were quite accurate in all other estimates; that is, only the co-occurrence of snakes and shocks was overestimated. A second study showed that it was the aversiveness of the shock rather than its greater salience per se that was responsible for this effect (Tomarken et al., 1989). Such biased judgments of the covariation between feared stimuli and aversive outcomes may well have the effect of promoting the maintenance or enhancement of fear. If one is already afraid of some object or situation and then overestimates the probability with which that object is paired with aversive events, fears should be maintained or exacerbated. Consistent with this, in one study participants who were treated for spider phobia as a group no longer showed this bias, but any residual bias they did show was predictive of return of fear 2 years later (de Jong, Merckelbach & Arntz, 1995).

In addition, several studies have extended the generality of the covariation-bias phenomenon by studying other categories of fear-relevant stimuli. For example, Pauli, Montoya, and Martz (1996) found that panic-prone individuals showed covariation bias for slides depicting fear-relevant situations, such as emergency situations and aversive outcomes. In addition, Pury and Mineka (1997) examined blood-injury fear-relevant stimuli (surgery slides or mutilation slides) compared with conceptually related fear-irrelevant stimuli and consistently found that participants overestimated the covariation between this class of fear-relevant stimuli and aversive outcomes (see Öhman & Mineka, 2001, for a comprehensive review).

As the preceding review suggests, a variety of different kinds of judgmental and interpretive biases have been shown to be associated with depression and various anxiety disorders. In all cases the biases lead emotionally disordered individuals to more negative conclusions about current ambiguous situations, to overestimates of the likelihood that bad things will happen in the presence of feared outcomes, and to overestimates of the probability of future negative events (and/or to underestimates of the probability of future good events). Thus it can be expected that each bias is likely to contribute to the maintenance of anxiety or depression.

Theories of Information Processing and the Emotional Disorders

As has been noted, anxiety and depression appear to have somewhat different effects on cognitive processing of mood-congruent information. The evidence is quite strong that anxiety is associated with preconscious and conscious attentional bias for threatening cues and that depression is associated with a memory bias for negative self-referential information (although both seem to be associated with various judgmental and interpretive biases). Theories of the effects of emotion on cognition need to be able to account for this apparent dissociation between the most prominent mood-congruent biases for these two different emotional disorders (J. M. G. Williams et al., 1988, 1997). The two theories originally used to account for the relationship between emotion and cognition—Bower's (1981) semantic associative network model and Beck's (1967, 1976) schema model—predicted that evidence for both attentional and memory biases should be evident in both anxiety and depression. The reason is that in both of these models different emotions are all thought to have the effect of giving priority to mood-congruent information at each stage of the information processing continuum—from early perceptual detection to subsequent recall and judgment. Such models would also suggest that attentional and memory biases might well be closely related because a common mechanism was hypothesized to be responsible for each. Unfortunately, there has been very little research that examines both attentional and memory biases within the same individuals. Thus we do not know about their interrelationship within individuals. However, as already discussed, any close relationship may be unlikely given that anxiety seems to be much more closely related to attentional biases than is depression, and vice versa for memory biases.

Only in the past 15 years have models been developed that have begun to help us to understand these differential effects of anxiety and depression on attention versus memory (e.g., J. M. G. Williams et al., 1988, 1997). Although the framework of Williams and his colleagues does a better job of accounting for these differences, it still has some difficulties in accounting for certain results in this complex array of findings (e.g., Mineka & Nugent, 1995; Mineka & Zinbarg, 1998). The Williams et al. (1988, 1997) model draws on the distinction made by Graf and Mandler (1984) between the *activation* or *integration* of mental representations, which is a relatively automatic process, and the *elaboration* of mental representations, which is a more strategic process. According to Graf and Mandler, integration results when exposure to a stimulus automatically activates an associated schema, leading to a strengthening of the internal organization of the schema. Integration makes the activated schema and its components more readily accessible, facilitating perception of schema-congruent information and implicit memory performance. However, explicit memory requires more elaborative processing, and so integration does not necessarily facilitate explicit memory (e.g., recall or recognition). Elaboration involves developing and strengthening connections between the

schema and other contextual cues at encoding and with other associated representations in memory; the effects of elaboration are reflected on tests of explicit memory.

Williams et al. (1988, 1997) also integrated the activation-elaboration distinction of Graf and Mandler (1984) with Oatley and Johnson-Laird's (1987) proposal that there may be unique modes of cognitive operation associated with the different primary emotions. They proposed that anxiety selectively activates mood-congruent (e.g., threatening) representations but reduces the tendency to elaborate mood-congruent representations (indeed, they hypothesize that anxiety leads to avoidance of elaboration in anxious individuals). This would account for the consistent pattern of preconscious (i.e., automatic) attentional biases for threatening material seen in anxiety patients and for the great paucity of findings on explicit memory biases for threatening material in anxiety. It would also predict findings of implicit mood-congruent biases in anxiety (e.g., C. MacLeod & McGlaughlin, 1995; Mathews, Mogg, et al., 1989) but has difficulty explaining the inconsistency of such results as those reviewed previously.

In contrast to anxiety, Williams et al. (1988, 1997) proposed that depression is characterized by a tendency to elaborate mood-congruent material to a disproportionate degree. This overelaboration of depression-relevant material would account for the consistent evidence seen in the depression literature for mood-congruent explicit memory biases (Matt et al., 1992). However, this elaboration does not stem from any special early activation of mood-congruent material, thus explaining early failures to find evidence for mood-congruent implicit memory biases (cf. Denny & Hunt, 1992; Watkins et al., 1992) and the relatively sparse and inconsistent evidence for attentional biases for negative information—especially at the preconscious or automatic level, when the biases for anxiety occur reliably. However, this proposal does not as easily explain why an implicit memory bias has recently been shown in at least four implicit memory studies of depressed individuals (Bradley et al., 1994, 1996; Bradley, Mogg, & Williams, 1995; Watkins et al., 1996).

The idea that anxiety is characterized by an early (and often automatic) selective attentional bias for threat and avoidance of more elaborative processing of this threat and that depression is associated with greater elaboration of and memory for depression-relevant information can be understood from the vantage point of psychoevolutionary theories of cognition and emotion (Cosmides & Tooby, in press; Mineka, 1992; Plutchik, 1984; J. M. G. Williams et al., 1988, 1997). According to these theories, cognition evolved as a means of shaping and regulating the adaptive function of emotions. Given that there were probably quite different pressures which shaped the evolution and development of anxiety and depression, it is not surprising that distinct modes of information processing would facilitate the function of different emotions (e.g., Mathews, 1993; Oatley & Johnson-Laird, 1987). For example, anxiety, like fear, would seem to require a cognitive system which could very quickly (and often automatically) scan for and perceive cues for danger, allowing for continuous monitoring of the environment for signals of potential threat. Depression, by contrast, involves reflective consideration of events that have led to failure and loss and would seem to require a cognitive system adept at remembering vital information concerning loss and failure to facilitate reflection on these important events. Thus anxiety as a forward-looking emotion may have evolved to be associated with attentional biases because such biases facilitate the very rapid detection of threat and its subsequent avoidance (Mathews, 1993). By contrast, depression as a more backward-looking emotion may be associated with memory biases, perhaps because, as Mathews (1993, p. 273) argued, "cognitive processes involved in the recall of past events and reflection on their meaning are more relevant to the function of sadness than are those involved in maintaining vigilance for possible future threat."

Higher Level and Social Cognitive Biases in Depression and Anxiety

The information processing biases in attention, memory, and judgment may serve the adaptive function of the emotions themselves. However, another broad set of *higher level* cognitive processes also may play an important role in shaping our emotions and in one sense may even serve as gatekeepers for emotions. These processes, which include individuals' perceptions of themselves and their abilities, of significant others and social interactions, and of the future and what it holds for them, are essential to the understanding of depression and anxiety. In particular, these higher level and social-cognitive factors play a part in determining whether life events are perceived as personally relevant, significantly harmful, or reflective of loss and failure. As such, they may play a part in the instigation and maintenance of anxiety and depression.

In the next section, we address higher level and social-cognitive models of the emotional disorders. In doing so, we use two frameworks, one borrowed from Beck's (1967) seminal cognitive theory of depression and the other from the cognitive science distinction between declarative and procedural knowledge (cf. Smith, 1994). To date, the majority of social-cognitive research in psychopathology has addressed depression rather than anxiety disorders; this imbalance is evident in the following sections.

The primary framework for this section adopts Beck's (1967) notion of a negative cognitive triad. Based on clinical observations, Beck hypothesized that a depressive cognitive style is characterized by a negative view of the self, the environment, and the future and that this negative

cognitive triad is the core proximal cause for depression. Beck's more general framework has generated abundant discussion, research, and a good deal of criticism, particularly for the causal aspects of the theory. In appropriating it here, we do not necessarily align ourselves with all aspects of Beck's theory, noting that several reviews (e.g., Haaga, Dyck, & Ernst, 1991) have uncovered serious problems with some of its definitions and hypotheses. However, there is strong evidence for the existence and descriptive value of the three components of the negative cognitive triad, which we believe serve as a useful heuristic organizational scheme. Specifically, social cognitive models can be classified as dealing with self-related, other-related, or future-related variables. This classification (with some acknowledged overlap between the classes) can aid researchers in recognizing present trends in the literature, as well as areas for future exploration.

A second, and very different, framework distinguishes between declarative and procedural features of cognition. Declarative features refer to the content and structure of stored knowledge, whereas procedural features refer to the processes, including attention and regulation, that are involved in the processing of information (Smith, 1994). This distinction between declarative and procedural knowledge has been used by social cognition personality researchers (e.g., Cantor & Kihlstrom, 1987; Kihlstrom & Klein, 1994). The terms *content* and *structure* (approximately equivalent to declarative features of cognition) and the term *processes* (approximately equivalent to procedural features of cognition) have also been used previously in classifying psychopathology research (e.g., Dobson & Kendall, 1993). Because it best fits in a review of psychopathology research, we use the distinction of content, structure, and process as a way to further subdivide each third of Beck's cognitive triad. In our review, we examine the current state of knowledge on each of these types of cognitive variables. In doing so, we try to clarify existing trends and to highlight promising areas for future investigation.

Self-Related Cognition

The greatest amount of social-cognitive research regarding depression and anxiety focuses on various aspects of the self. A denigrating view of one's self, which is so common to negative affect, as well as a heightened attention to the self and an idiosyncratic organization of self-knowledge, may play roles as vulnerability, maintenance, and/or recovery factors in anxiety and depression. Particularly in depression, the role of self-cognition is so central that some have equated Beck's (1967) notion of a depressive schema with a depressive *self*-schema (cf. Shaw, 1985). In this section, we review the literature that explores the role of self-related cognitive content, structure, and processes in abnormal affect.

Self-Related Content

Perhaps the most straightforward cognitive generalization about depression and anxiety is that individuals with these disorders hold idiosyncratic negative beliefs about themselves; that is, they view themselves more negatively than do normals. In this section, we discuss the evidence for this claim and review issues of measurement, mood-state dependence, content specificity, congruence effects, and the suggestion that mood disorders are characterized by an evenhanded, rather than a negative, outlook.

The Nature of Self-Related Content. Initially, investigators sought to examine negative self-related beliefs using self-report measures such as the Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978) and the Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980). Although these measures are consistently related to depressive symptoms, in the past several critics have suggested that such measures are more likely to detect symptoms or concomitants rather than vulnerability or maintenance factors for depression (e.g., Barnett & Gotlib, 1988; Haaga et al., 1991). This is consistent with findings that DAS scores decrease following remission from depression, even when the remission results from pharmacotherapy (e.g., Fava, Bless, Otto, Pava, & Rosenbaum, 1994). In addressing the possibility that a dysfunctional schema is only a concomitant of depressed mood, Persons and Miranda (1992) presented results consistent with a mood-state dependence model that posits that depressive cognitive schemata do evidence stability but, importantly, that they remain dormant unless activated by stress or negative mood. The combination of a stable (though dormant) chronic vulnerability and an eliciting event activates the depressive schema and serves as a proximal cause for depression (see also Zuroff, Blatt, Sanislow, Bondi, & Pilkonis, 1999, for further support of the idea that depressive schemata are mood-state dependent).

A different critique of work using the DAS is that self-report questionnaires that purport to tap depressive self-schemas actually use the cognitive "products" of the schema to infer its existence (e.g., Dobson & Kendall, 1993). Therefore, several investigators have utilized methodologies that go beyond self-report scales and, in doing so, have elaborated and clarified the term *depressive schema*. For example, using a self-referent encoding task, Derry and Kuiper compared depressed, psychiatric control, and nonpsychiatric control groups and found that the depressed group showed evenhanded recall (Derry & Kuiper, 1981) or superior recall (Kuiper & Derry, 1982) of depressive self-referential words, whereas both nondepressed groups had superior recall of neutral self-referential words. Thus, in refining the definition of an underlying depressive schema, Kuiper and Derry suggested that vulnerability to depression stems from holding a chronically

accessible set of negative self-related information, the presence of which can be another measure of depressive schemas (see our earlier detailed discussion of memory biases).

As with the self-report measures (e.g., the DAS), it appears that the differences in the accessibility of self-related content between individuals with and without depression is mood dependent (e.g., Sutton, Teasdale, & Broadbent, 1988). Thus Persons and Miranda's (1992) analysis of mood-primed cognition is relevant here as well. For example, Gilboa and Gotlib (1997) compared nondysphoric individuals who were or were not previously dysphoric. Following a negative mood induction, the vulnerable individuals displayed higher incidental recall of negative words, a finding that is consistent with those of Persons and Miranda (1992).

In addition, Abramson, Alloy, and their colleagues (Alloy, Abramson, Murray, Whitehouse, & Hogan, 1997; McClain & Abramson, 1995) recently reported two studies that utilized a somewhat different methodology to assess the self-schemata of depressives. On a self-report task requiring me–not-me judgments, students at risk for depression endorsed more numerous negative traits. Importantly, an analysis of reaction times revealed that the at-risk participants endorsed negative items more rapidly, indicating increased accessibility. Moreover, scores on this judgment task interacted with relevant life stress to predict depression: Individuals with more negative self-schemata became more depressed when life stress was high. Thus, well-designed tasks do provide evidence for a diathesis role of negative self-content for depression. No similar studies on vulnerability to anxiety were located.

The Specificity of Self-Related Content

Subsequent elaborations of Beck's (1967) cognitive model of depression built on observations that negative content also appeared to be present in anxiety (e.g., Beck & Emery, 1985) and in other forms of psychopathology. This led Beck and his colleagues to suggest a *content-specificity effect*, which applies to both depression and anxiety. The content-specificity approach posits that self-related information comprises two specific sets of cognitive beliefs for anxiety and depression, as well as a third general set shared by the two disorders (D. A. Clark, Beck, & Stewart, 1990). This view is quite consistent with L. A. Clark and Watson's (1991) tripartite model of affective disorders, which notes that high levels of negative affectivity are common to the two disorders, whereas specific symptom sets are also unique to each disorder (see also D. A. Clark, Steer, & Beck, 1994; Steer, Clark, Beck, & Ranieri, 1995).

Several investigations from other research groups have also supported the content-specificity hypothesis, although not all of these tested the existence of cognitions that are common to the two disorders. For example, Jolly and Dykman (1994) provided evidence for both the specific and the general components of this model in reporting that, although danger-related cognitions predicted anxiety and loss or failure cognitions predicted depression, a third group of cognitions seemed generally predictive of both sets of symptoms (see also Westra & Kuiper, 1997, and Woody, Taylor, McLean, & Koch, 1998, for related demonstrations). However, D. A. Clark and Steer's (1996) recent review suggests that loss and failure cognitions may show more specificity to depression than do harm and danger cognitions to anxiety.

In an extension of the content-specificity hypothesis, Beck (1983, 1987) elaborated on the idea that specific contents serve as vulnerability factors in depression (see Blatt & Zuroff, 1992, for a similar conceptualization that is rooted in a psychodynamic approach). Focusing on broad personality organization, Beck identified two possible "modes"—*sociotropy* and *autonomy*—which may place individuals at risk for depression. The sociotropic mode involves an overvaluation of relationships, including strong dependency and acceptance needs. The autonomous mode involves an overvaluation of personal achievement, strong independence, and a need for success. These modes are thought to precipitate a depressive reaction when the individual faces a congruent stressor: loss or rejection (for sociotropy) and failure (for autonomy). These predictions regarding specific personality vulnerability are most appropriately tested in prospective studies that examine whether individuals with either personality mode are more likely to become depressed (or to relapse following recovery) when a congruent stressor occurs. The findings of many such studies were summarized by Coyne and Whiffen (1995), who concluded that support for the congruency model is inconsistent. On the whole, it appears that autonomy or self-criticism (at least as assessed by current self-report instruments) is more consistently a marker of distress than a vulnerability to it (although see Segal, Shaw, Vella, & Katz, 1992). In contrast, dependency cognitions associated with sociotropic personalities received some support as both a marker of distress and a vulnerability for depression.

As noted by Beck (1996), loss, rejection, and failure may be particularly potent themes in depression because of their evolutionary significance. Other central themes or personality modes also related to various evolutionarily significant tasks may be active in anxiety disorders. One example already mentioned is the role of harm and danger themes in anxiety, particularly in GAD. In addition, Salkovskis (1999; see also Tallis, 1994) suggests that individuals with OCD struggle with a core theme of *personal responsibility* over possible harm or danger. Driven by this core theme, they tend to overvalue normally occurring intrusive thoughts, imbuing them with great significance.

Subsequently, they seem motivated to neutralize anxiety and guilt or blame by engaging in overt or covert acts (compulsions).

Accuracy of Self-Content. Are depressives negatively skewed in their cognitive content or do they simply have an evenhanded view of the world, free from the rosy tint of nondistressed individuals? A discussion of cognitive content in depression should clearly address this question, yet answering it is no small feat. Specifically, to examine the truth value of self-related depressive cognitions, investigators need to establish an objective reference with which depressive beliefs can be compared.

Some insight into the accuracy question comes from the literature on "depressive realism," which has focused more on judgmental processes than on cognitive content. The first demonstration of such a realism effect (Alloy & Abramson, 1979) was based on a contingency paradigm, in which students had to estimate their control over the onset of a light. Dysphoric students showed more accurate estimation, whereas nondepressed students displayed "illusions of control." In reviewing the inconsistent literature that ensued on this topic, Ackermann and DeRubeis (1991) argued that depressive realism may be limited to laboratory contingency situations. In other situations, such as in the assessment of both past and future life events, dysphoric or depressed individuals do display a pervasive negatively biased view (cf. Pacini, Muir, & Epstein, 1998, for a possible explanation of the limited occurrence of depressive realism in "trivial" situations). Nevertheless, the work on depressive realism has emphasized the fact that the "norm," or cognitive content of nondistressed individuals, may be equally or more biased in the other direction. Specifically, optimism, elevated self-esteem, and illusions of control characterize "normal" thinking (cf. Taylor & Brown, 1988).

Self-Related Structure

Several authors have suggested that moods and mood disorders are associated with an idiosyncratic *structure* of self-knowledge, arguing that particular features of the organization of self-knowledge (e.g., differentiation, integration, complexity) influence mood above and beyond the influence of informational content. As a group, the contemporary models of self-structure have their roots in the early cognitive work of Kelly (1955), Zajonc (1960), and Block (1961). Adopting some of the terminology of these cognitive pioneers, the contemporary models seem to address two broad issues: the differentiation and the integration of the self-concept (cf. Campbell, Assanand, & DiPaula, 2000). Differentiation is the extent to which one's self-representation is multifaceted and contains several selves or roles. Integration is the extent to which these multiple facets are similar, clear, consistent, or overlapping.

Differentiation Variables. Do individuals with multiple selves, aspects, roles, or identities differ in their vulnerability to mood disorders? Several researchers have argued that maintaining a multifaceted view of oneself (i.e., high self-complexity) may serve as a buffer of negative life events. For example, Linville (1985) found that compared to normal students low on self-complexity, normal students high on self-complexity experienced less negative affect in response to failure and experienced more moderate fluctuations in their moods in a 2-week study using daily diaries. Brown and Rafaeli (2001) also found that more differentiated students, those who reported more numerous self-aspects, experienced fewer depressive symptoms in response to stress. However, a recent meta-analysis of the self-complexity literature (E. Rafaeli & Steinberg, in press) shows that low cognitive differentiation (i.e., low self-complexity) is at best a weak vulnerability for future depressive symptoms following stress. Moreover, the cross-sectional relationship in the absence of measured stress of high self-complexity with depression, negative mood, or poor well-being is slightly positive. Thus holding few cognitive self-aspects may act as a weak vulnerability factor in times of stress but may be a mildly adaptive strategy at other times. (For a discussion of self-complexity measurement, see E. Rafaeli-Mor, Gotlib, & Revelle, 1999).

Few of the studies on cognitive differentiation (and cognitive structure in general) have explored these effects in clinical samples. In the few studies that did, no relationship was obtained between differentiation (Linville's [1985] self-complexity index) and abnormal affect (cf. E. Rafaeli & Steinberg, in press). Moreover, one study found that clinically diagnosed depressives actually show a higher cognitive differentiation but only of negative information about themselves (Gara et al., 1993).

Integration Variables. Integration refers to the similarity or shared variance between pairs of self-aspects (e.g., Brown & Rafaeli, 2001; Donahue, Robins, Roberts, & John, 1993). Individuals who lack integration are those who view themselves as quite different in their various roles. Are consistency and overlap across different selves signs of positive well-being, protective factors against stress, or emotional liabilities? Most theorists view integration (i.e., consistency or coherence) as a marker of well-being (Campbell et al., 2000; Donahue et al., 1993). Low integration has been termed "fragmentation" by some and has been equated with a lack of identity or a poor articulation of the self. For example, Block (1961) found that individuals with "role stability" were less susceptible to anxiety and to other forms of maladjustment.

In contrast to these authors, Linville (1985, 1987) suggested that high overlap between different selves increases the risk of a spillover effect, a process of spreaded activation of affect in response to stress. Unfortunately, most self-complexity studies have used Linville's own measure, which has been found to reflect only the differentiation component of her model, not the integration component (E. Rafaeli-Mor et al., 1999). However, two studies using an appropriate integration index with normal participants demonstrated that overlap among self-aspects buffers the effects of severe stress but exacerbates the effects of minor hassles on depressive symptoms (Brown & Rafaeli, 2001; E. Rafaeli-Mor & Brown, 1997).

Self-Related Cognitive Processes

We have reviewed several features of the content and the structure of self-knowledge in emotional disorders. Both of these classes of variables reflect *declarative knowledge*. However, there appear to be particular features of higher level cognitive *processes* focused on the self that are also related to disordered mood. This section covers two sets of processes: goal-directed cognition (self-regulatory processes) and self-focused attention.

Self-Regulatory Processes. Regulatory processes govern goal-directed behavior. These processes bring together cognition and motivation and play a major role in both normal and abnormal affect (Carver & Scheier, 1990). For example, certain features of motivation and of self-regulation are primary symptoms in both anxiety (e.g., the heightened goals of averting an impending disaster) and depression (e.g., the apathy and lack of motivation characteristic of individuals with major depression). Additionally, affective states are often a function of the subjective assessment of the status of one's goal pursuits (Emmons & Kaiser, 1996). In this section, we highlight some findings regarding mood, affect, and self-regulatory processes.

Most goal theories have at their base a cybernetic model of self-regulation. Goal-directed behavior is guided by a discrepancy-reduction process, a Test-Operate-Test-Exit (TOTE) cycle (e.g., Carver & Scheier's [1982] control theory). Individuals maintain a representation both of goals and of current states. In an iterative process, individuals compare (test) the current and strived-for states. They then operate on any discrepancy, attempting to reduce it. Finally, when the test reveals a sufficiently small discrepancy, individuals exit this feedback loop. Negative affect, depression, and anxiety can influence the inputs to this process (both the perceived "actual" state and the strived-for state) or the dynamics of the process itself. We address declarative parameters of goal systems (i.e., their content and structure) that have been related to mood disorders (see Austin & Vancouver, 1996, and Emmons, 1996, for recent reviews that examine the functioning of the self-regulatory processes in these disorders, a topic not covered here.)

Inputs to self-regulatory process: actual and strived-for states. As discussed earlier, in the sections devoted to the content and structure of declarative self-knowledge, depressed and anxious individuals often hold a self-view (the "actual self") that is qualitatively different (e.g., more negative and less integrated) from that of nondisordered individuals. The actual self is one input into the regulatory process. We now elaborate on the second input, which are the strived-for states, goals, or standards.

Goals are often categorized by the type of motivation or need implicit in them. Recent work with nonclinical participants has revealed lawful cross-sectional and exacerbating relationships between different motivations or needs (e.g., intimacy, power, generativity) and affect (cf. Emmons, 1996). Goals can also be categorized using several theoretically based classification schemes. Deci and Ryan (1985) differentiated between different sources of goals. Using their scheme, Sheldon and Kasser (1995) found that holding extrinsic goals was associated with lower life satisfaction and less positive affect than was holding intrinsic ones. Similarly, individuals who hold "judgment/performance" goals (similar to extrinsic goals) are thought to respond to failure with hopelessness, whereas those who hold "development/mastery" goals (similar to intrinsic goals) respond with renewed effort (cf. Grant & Dweck, 1999). Grant and Dweck argue that this difference reflects an implicit theory regarding the malleability of personal abilities, traits, and characteristics. People who are implicit "entity theorists" (i.e., those who believe that abilities are set and traits are fixed) view their successes and failures as performance tests, and so each failure is a threat or a loss rather than a challenge. Such thoughts are pervasive in depressive and anxious states.

A widely used categorization scheme for goals is the model of Higgins and his colleagues, first known as self-discrepancy theory and later broadened into a discussion of regulatory foci (Higgins, 1999; Higgins, Bond, Klein, & Strauman, 1986). This model stems from the distinction of approach and avoidance systems, mediating pleasure and pain respectively. Individuals are seen to differ in their focus on each of these systems. Individuals with a *prevention* focus are those who are highly sensitive to the presence or absence of pain. Individuals with a *promotion* focus are highly sensitive to the presence or absence of pleasure. This differential sensitivity, along with strategic predilections to use approach behaviors or avoidance behaviors, are the main components of the regulatory foci.

Higgins's and others' distinction between approach and avoidance goals may be the most important contribution of goal theories to the study of emotional disorders. Both theoretically and empirically, approach goals have been related to behavioral activation and to positive affect, and avoidance goals have been related to behavioral inhibition

and negative affect (Higgins, Shah, & Friedman, 1997). Emmons and Kaiser (1994, cited in Emmons, 1996) and Elliot, Sheldon, and Church (1997) found that a higher proportion of avoidance goals (and a lower proportion of approach goals) was associated with neuroticism, depression, anxiety, and decreased positive affect, both concurrently and over longer periods of time. This latter finding may mask the divergent roles of avoidance and approach goals (cf. Higgins, 1999) by combining them into a simple ratio index.

Regulatory foci provide a broad framework within which some more specific mechanisms operate. One central postulate is that people compare their actual selves to one of two self-guides: the "ideal" self and the "ought" self (Higgins et al., 1986). The ideal self is composed of characteristics that an individual desires to have. The ought self is composed of those characteristics which an individual (and very often significant others) believes he or she should have. Individuals vulnerable to depression or anxiety may have a particular regulatory focus, that is, chronic accessibility of a particular self-guide. When a self-guide is accessible and discrepant from the actual self, specific affect is generated. In an ought-actual discrepancy, these are agitation-related emotions (i.e., anxiety or high negative affect), whereas in an ideal-actual discrepancy, these are dejection-related emotions (i.e., low positive affect and depression).

Higgins's self-discrepancy model is unique among regulatory-process models in its clear clinical predictions and in the amount of empirical attention given to these predictions. Strauman and Higgins (1988) reported finding the expected predictive relationship between ideal-actual (I/A) discrepancies and dejection and between ought-actual (O/A) discrepancies and agitation 2 months later. In a cross-sectional study, Strauman (1989) found the greatest I/A discrepancies in a depressed group and the greatest O/A discrepancies in a socially phobic group, both when compared with each other and with a control group (see also Scott & O'Hara, 1993, for related results in diagnosed depressed and anxious students). In addition, Strauman (1989) found that when a particular discrepancy (I/A or O/A) was temporarily primed, the effect of the priming was strongest in the group that had the greater chronic accessibility to this discrepancy (i.e., depression and I/A, social phobia and O/A). Fairbrother and Moretti (1998) further found that depressives were higher on I/A discrepancies than remitted depressives, who were themselves higher than nondepressed controls. Finally, extending these findings to psychophysiological measures of emotional distress, Strauman, Lemieux, and Coe (1993) reported that priming anxious or dysphoric individuals with their own (but not with others') ought-self or ideal-self, respectively, leads to an increase in the stress hormone cortisol and a decrease in natural killer cell activity. Overall, given the high degree of overlap between depression and anxiety (both being high in negative affectivity), the specificity of these results are as striking as those generally found for the basic cognitive biases in attention and memory, described earlier in this chapter.

Much of the research on goals and goal orientation has relied on self-reports (e.g., work by Emmons and others in which goals are inferred from an open-ended task in which participants list their current life goals). As with other self-report indices, the concern is raised that the predictor variable (in this case, regulatory focus) may simply be a symptom of the disorder rather than a causal construct. Recently, however, less transparent methods have also been used to operationalize goal orientation and self-discrepancies. For example, Higgins et al. (1997) operationalized regulatory focus using response latencies to measure accessibility of the self-guide. Results using more sophisticated methods like this have produced encouraging results.

The structure of goals. Individuals' goal systems differ not only in the content (identity) of the goals but also in their organization. Goal systems can be more or less integrated, conflicted, or defined; each of these dimensions is associated with differences in affect and affective symptomatology. For example, Emmons and King (1988, 1989) found that dissimilarity and inconsistency within goal systems (such as in approach-avoidance conflicts or other kinds of conflicting goals) were associated with negative affectivity and depressive symptoms, both concurrently and over time. One clue to the cause of this effect is that conflicting or ambivalent goals tend to promote less action and more rumination; thus they remain in focus but often are not reached. A preponderance of high-level goals that are vague and abstract in detail has also been found to be related to negative affect and anxiety (Emmons, 1992), perhaps because such high-level goals are more difficult to achieve and are associated with greater frustration (although with greater meaning, as well; e.g., Little, 1989). However, Pennebaker (1989) proposed that high-level thought is a consequence, not a cause, of negative affect. According to Pennebaker, distress leads to a change in thinking, from concrete levels to broad, abstract, and self-reflective thinking. Pennebaker suggested that one might view such high-level thought as repressive and avoidant and therefore as a (poor) defense against distress.

Self-Focused Attention. The process of attending to the self is embedded within a self-regulatory framework and is part of the comparison of the actual to the standard. Self-focused attention is both a state in which we all can be found at times and an individual difference variable that reflects the degree to which individuals tend to focus on themselves and their attributes. Pyszczynski and Greenberg (1987) suggested that depressives are high on the self-focus trait and attend particularly to negative aspects of themselves. Elaborating on this link, Ingram (1990) sug-

gested that self-focused attention (particularly "self-absorption"—a more rigid and excessive type of self-focus) is related to a wide range of psychopathological conditions, including depression, anxiety, alcohol use, and other disorders.

More recently, a meta-analysis (N. Rafaeli-Mor, 1999; Mor & Winquist, 2001) systematically examined the relationship between self-focused attention and emotional distress. The overarching relationship of self-focus and negative affect was found to be moderately positive, but this relationship was qualified by several important caveats. The effects were strongest within clinical and subclinical ("analogue") populations relative to nonclinical samples. Consistent with Nolen-Hoeksema's (1991) response styles theory, studies that examined the ruminative type of self-focus, in which individuals focus on their depressed mood and its possible causes and consequences, revealed stronger associations of ruminative self-focus to negative affect than of nonruminative self-focus. As might be expected, studies that examined attentional focus on negative versus positive aspects of the self or focus on the self following a failure versus a success reported a stronger effect on negative affect (Mor & Winquist, 2001).

Private self-focus, which is defined as attention to internal experiences, such as thoughts or moods, has been differentiated from public self-focus, which is defined as attention to social or public aspects of one's self (such as one's appearance; e.g., Fenigstein, Scheier, & Buss, 1975). An interesting pattern revealed by Mor and Winquist's (2001) meta-analysis concerns the different relationships between depression versus anxiety and private versus public self-focus. Specifically, there are strong correlations of both public and, especially, private self-focus with depressive symptoms (with private self-focus having a significantly stronger effect over numerous replications). In contrast, only public self-focus was associated with anxious symptoms. Mor and Winquist (2001) suggest the possibility that Higgins's self-discrepancy theory (described earlier) may be useful in understanding these differential associations. Specifically, focus on public self-aspects is likely to activate "ought" discrepancies (by calling attention to the self as visible to others), perhaps leading to increased negative affect, which plays a part in both depression and anxiety. In contrast, focus on private self-aspects is likely to activate "ideal" discrepancies (by calling attention to the individual's wishes, plans, and goals), perhaps leading to decreased positive affect, a unique feature of depression (cf., L. A. Clark & Watson, 1991).

Finally, several self-focus researchers have examined the issue of causality or antecedence. Mor and Winquist's (2001) meta-analysis reviews evidence that self-focus can be either an antecedent, concomitant, or consequence of disordered affect. Thus self-focus and negative affect may display the fugue-like pattern we discussed in the overview with regard to cognition and emotion in general. Although both could be causes and consequences, their most prominent feature is the way they maintain each other in a cyclical pattern.

We have reviewed evidence for the negativity of cognitive self-related content, as well as evidence for some biases in the organization of this self-related information in emotional disorders. We have also reviewed two promising avenues of exploration into self-related cognitive processes and emotional disorders: goal-directed self-regulation and self-focused attention. It is important to note that much of this research has been limited to analogue populations; we hope this review will motivate psychopathology researchers to examine these models with appropriate clinical designs.

Other-Related Cognition

Are the biases seen in emotionally disordered individuals in the content, structure, and processing of social-cognitive information limited to the self or do they also occur in the way these individuals process information about others? In answering these questions, we review studies that examine the way mood-disordered people view others, process information about others, and believe others perceive them.

Other-Related Content

Weary and Edwards (1994) reviewed the findings regarding person perception biases in depression and anxiety. For example, dysphoric individuals do not differ from normal controls in the accessibility of negative information about target others (e.g., Bargh & Tota, 1988). However, dysphorics do have an increased expectation of future negative events in the lives of hypothetical others, but not in the lives of actual people in the social environment (Pietromonaco & Markus, 1985).

Few studies have examined the social judgments of clinically depressed and anxious patients. Butler and Mathews (1983) found that patients with GAD did not hold biased negative expectations for other people but that patients with major depression did. Gara et al. (1993) reported that depressed individuals viewed significant others more negatively and less positively than did control participants. Additionally, within the depressed group, those with more severe symptoms had a less positive view of others (and of self). Finally, are biases in other-related cognition driven by the same biased content that drives self-related cognition? Andersen, Spielman, and Bargh (1992) provided evidence that they are not. Instead, other-related bias is likely to be driven by other-schemata or by future-schemata and not necessarily by the negative self-schema.

Other-Related Attention

Dysphoric individuals also show an increased attention to social information (e.g., Weary, Marsh, & McCormick, 1994). Weary suggests that as a consequence of their feelings of lack of control, depressives pay increased attention to clues about causality in an attempt to regain control. Whether this quest for information is also typical of individuals with major depression or anxiety disorders is unclear. Indeed, it seems quite possible that at least for clinical depression, which is characterized by pervasive feelings of helplessness and hopelessness (discussed in a subsequent section), such attempts to regain a sense of control would be relinquished (Abramson, Metalsky, & Alloy, 1989; Alloy, Kelly, Mineka, & Clements, 1990).

Interpersonal Cognitive Dynamics

Researchers who focus on interpersonal process in depression and anxiety have developed an interactional model that emphasizes the ways in which the motives and behaviors of depressed individuals maintain their disorder (e.g., Coyne, 1976; Joiner & Metalsky, 1995). These interpersonal processes involve cognition, in addition to motivation (e.g., self-verification needs; see Swann & Read, 1981) and behavioral skills (Coyne, 1976). A key cognitive factor in the interpersonal dynamics of individuals with mood disorders is their perception of others' criticism, and, more generally, others' perceived stance toward them. For example, Hooley and Teasdale (1989) found that in successfully treated unipolar depressed patients, the patients' perceptions of spouses' criticism was a strong predictor of 9-month relapse, above and beyond the actual criticism or the degree of marital distress. Indeed, perceived criticism has a powerful exacerbating effect on depression and other disorders (cf. Butzlaff & Hooley, 1998).

Any discussion of cognitive interpersonal dynamics must also mention attachment theory, which has become a prominent framework for understanding both normal and abnormal affective and interpersonal functioning. The theory suggests that insecurely attached children (e.g., Bowlby, 1980) and adults (e.g., Hazan & Shaver, 1987), are prone to anxiety and depression and hold chronically accessible "mental models" of significant others as rejecting and unavailable. Work by Baldwin and colleagues suggests that idiosyncratic cognitive representations (which include self- and other-schemata and an interpersonal script) underlie attachment styles; attachment "styles" are simply an aggregation of a person's chronically accessible "if-then" interpersonal contingencies (Baldwin, Fehr, Keedian, Seidel, & Thomson, 1993). For example, insecure participants who were primed with the sentence stem "if I trust my partner, then my partner will . . ." were quicker to recognize *hurt* (as opposed to *care*) as a word in a subsequent semantic judgment task (see also Baldwin & Sinclair, 1996). Combining experimental work on attachment with the issue of perceived criticism, Baldwin (e.g., Baldwin & Holmes, 1987; see Baldwin, 1999, for review) also demonstrated the self-evaluative impact of perceiving criticism. Individuals subliminally primed with the face or name of a critical other (e.g., a scowling picture of the pope for a sample of Catholic students) were more self-critical after a failure in a rigged task and overgeneralized their failure more than did those primed with a noncritical other.

In sum, cognitive biases in the perception of others, particularly the attention given to others' criticism, appear to play an important role in generating negative affect and harsh self-evaluations among depressed and anxious individuals. However, very little of this research has been done with clinical samples, and almost none at all has addressed anxiety disorders, although such research is clearly called for.

Future-Related Cognition

A bleak and joyless future or a danger-fraught one seems to be the rule in the minds of individuals with emotional disorders. This phenomenon is the third component in Beck's (1967) negative cognitive triad. Idiosyncratic forecasts or anticipations of the future are a defining feature of anxiety disorders. The perception of the future also plays a major role in depression, although this disorder also has a retrospective focus on past loss or failure. Consequently, several social-cognitive models of these disorders emphasize the role of future-related cognitions, including hopelessness, helplessness, control, and efficacy expectancies.

We review here several of the approaches that address future-related cognitions. Given that self, world, and future (the three subsections of our social-cognitive discussion) are not truly distinct, some future-related topics (such as goal systems and judgmental biases) were discussed elsewhere, and constructs are included here which could themselves be located in other sections. The remaining material is divided into two subsections. The first is devoted to helplessness, hopelessness, and attributional style, which involve both cognitive content and processes. The second discusses related issues of self-efficacy and uncontrollability (cognitive contents).

Hopelessness and Explanatory Style

The learned-helplessness theory of depression (Seligman, 1975), its reformulation (Abramson, Seligman, & Teasdale, 1978), and its direct descendent, the hopelessness theory of depression (Abramson et al., 1989), have made up one of the most influential strands of cognitive theories of psy-

chopathology. In its current formulation, the hopelessness theory proposes an etiological vulnerability model for a particular subtype of depression, hopelessness depression. Hopelessness cognitions (i.e., the expectation that one has no control over what is going to happen and the absolute certainty that an important bad outcome will occur or that a highly desired good outcome will not occur) are hypothesized to be a proximal sufficient cause for this subtype of depression. In other words, once hopelessness cognitions about an important event occur, hopelessness depression is bound to follow.

Hopelessness cognitions may stem from several contributory factors, but the theory focuses on the operation of traitlike pessimistic attributions or explanations of particular negative life events. Specifically, people with a depressogenic explanatory style who experience negative life events are likely to make pessimistic attributions about the causes of those events, which can lead to hopelessness and then depression. The traitlike style involves attributing negative events to causes that are global (i.e., affect a broad range of life domains) and stable (i.e., are expected to wield their effect well into the future). In this theory, hopelessness depression is hypothesized to develop in individuals with a pessimistic attributional style who also experience negative life events *only* if they also respond to these events with feelings of hopelessness—the proximal sufficient cause of hopelessness depression.

Some support for this theory has been building for more than 20 years. First, ample research has documented that depressed (and sometimes anxious) individuals do tend to show a depressive explanatory style for negative events and often for positive events as well (i.e., attributing positive outcomes to specific and unstable factors; see Sweeney, Anderson, & Bailey, 1986, for an early meta-analysis; see also Barnett & Gotlib, 1988; Buchanan & Seligman, 1995; Joiner & Wagner, 1995, for reviews; see Mineka, Pury, & Luten, 1995, for a review with anxiety disorders). More important, however, for the past decade research has been examining hopelessness theory with prospective tests of the diathesis-stress component of the theory and for the mediational role of hopelessness. Several supportive studies with college students found that those with a pessimistic attributional style who also had low self-esteem and had experienced a negative life event were most likely to develop a depressed mood for several days, and hopelessness has at least partially mediated this effect (e.g., Metalsky & Joiner, 1992; Metalsky, Joiner, Hardin, & Abramson, 1993; but see Ralph & Mineka, 1998, for a somewhat different pattern of results). More important, a major longitudinal prospective study of students who are hypothesized to be at high risk for unipolar depression because of their pessimistic attributional style (and dysfunctional beliefs; cf. Beck, 1967) is currently under way. These students are being followed for 4 or more years to test major tenets of this theory. Only partial results have been reported to date. These indicate that the high-risk group (especially those who ruminate about their negative thoughts and moods) was eight times more likely than the low-risk group to develop an episode of hopelessness depression in the first 2½-year period (41% vs. 5%); rates for a first onset of *DSM-III-R* major depression were 17% vs. 1%, respectively. Similar results were reported for increased recurrences in the high-risk group (Alloy et al., 1999). However, these results are still rather preliminary: Findings regarding whether stress interacts with negative cognitive styles and whether it does so in the way postulated by the theory (with hopelessness as a mediator) have not yet been reported. In addition, more work is needed on the validity of the hopelessness depression construct itself in that some have argued that evidence that it is a distinct subtype of depression is weak (e.g., Whisman & Pinto, 1997).

The hopelessness model of depression was extended in order to account for certain aspects of anxiety disorders, as well, especially for the patterns of overlap observed between anxiety and depressive disorders. Specifically, Alloy and Mineka and colleagues presented a helplessness-hopelessness theory that addresses many of the interrelationships between depression and anxiety disorders, especially their high comorbidity and sequential pattern (with anxiety more often preceding depression than the reverse; Alloy et al., 1990). In essence, this model presents an etiological route, leading from uncontrollable events to helplessness (sense of uncertain or certain inability to control important events) and sometimes further to hopelessness (expectations both of certain helplessness and of certainty of a negative outcome). In this model, the experience of uncontrollable events is seen as common to both depression and anxiety, instigating feelings of helplessness. Anxiety disorders are characterized by varying degrees of subjective probability of helplessness (ranging from uncertain to certain) with negative outcomes, whereas depression is marked by certain helplessness and hopelessness, that is, complete conviction that negative events will happen. Thus anxiety will often precede depression temporally (both within episodes and across the lifetime) and will sometimes occur without depressive symptoms (whereas the inverse is less common).

Another important feature of comorbidity is the higher comorbidity of certain anxiety disorders, as opposed to others, with depression. The helplessness-hopelessness model explains this by reference to the scope of helplessness and hopelessness in each disorder. Those anxiety disorders in which anxiety and helplessness are related to a narrow domain (e.g., in a specific phobia) will engender uncertain helplessness and primarily anxiety symptoms. When the helplessness is limited to one domain, comorbid depression is not likely to develop. In contrast, in the more severe (and pervasive) anxiety disorders (e.g., PTSD and OCD), the sense of helplessness becomes more certain

and of a broader scope (including helplessness over OCD or PTSD symptoms themselves) and therefore more likely to give rise to comorbid depression. Full-blown hopelessness depression is hypothesized to set in when the person also becomes certain that negative outcomes will occur (i.e., hopelessness cognitions set in). Epidemiological studies are generally consistent with this pattern of differential comorbidity (cf. Mineka et al., 1998), although a great deal of work is needed to test more specific aspects of the theory.

Self-Efficacy and Controllability Beliefs

A rich research tradition has documented the role of lack and loss of control in stress reactions, fear, anxiety, and depression (see Mineka & Hendersen, 1985; Mineka & Kelly, 1989, for reviews). The majority of this work has been concerned with the effects of prior experience with uncontrollable and/or unpredictable events on subsequent behavior, motivation, and learning. Early demonstrations of the deleterious effects of uncontrollable stress often used animal models of anxiety (e.g., Mineka, 1985; Mineka & Zinbarg, 1996; Mowrer & Viek, 1948) or depression (Overmier & Seligman, 1967; Seligman & Maier, 1967). The work led to the development of the learned-helplessness model of human depression, which later evolved into the helplessness-hopelessness theory reviewed here.

In the past three decades, much work has focused on trying to understand the cognitive processes that mediate the effects of unpredictable, uncontrollable stress. One way in which the view of control has expanded has been through increased attention to *perceived* control and prediction, particularly within self-efficacy theory. Self-efficacy theory emphasizes the importance of beliefs about control or about the capacity to carry out certain behaviors in pursuing (or avoiding) certain goals (Bandura, 1986). Two features distinguish this approach from the helplessness-hopelessness model. First, it distinguishes between two types of expectancies that play a part in producing action or emotion. *Outcome expectancies* are beliefs regarding the contingency of an outcome on a behavior; that is, the likelihood that an outcome will occur if the behavior is performed. *Self-efficacy expectancies* reflect the belief in one's capacity to carry out the behavior (regardless of the outcome expectancy). Second, self-efficacy researchers (e.g., Cervone, 1997; Cervone & Scott, 1995) emphasize the contextuality of efficacy beliefs, that is, efficacy beliefs can be task specific. And although they may generalize from one context to another, they do so through idiosyncratic networks of subjective similarities. For example, to be able to accurately predict the generalization of therapy gains from exposure treatment of one agoraphobic situation to another, the therapist needs to establish each individual's idiographic network of similarities between feared activities or contexts.

Self-efficacy theory and uncontrollability theories can be viewed as cognitive, future-related models of both anxiety (Bandura, 1988; Mineka & Kelly, 1989; Mineka & Zinbarg, 1996) and depression (Alloy et al, 1990; Bandura, 1986; Miller, 1979; Mineka et al., 1998). According to such models, each based on a substantial amount of research, individuals who believe they lack the ability to cope, behaviorally or cognitively, with a potential threat are prone to experience anxiety or depression. For example, in an elegant experiment on perceived control, Sanderson, Rapee, and Barlow (1989) exposed panic-disorder patients to 20 minutes of 5% carbon dioxide–enriched air. All patients were told that adjusting a dial would reduce the rate of infusion of CO_2, but only if a red light was on. For half the patients, the light was on for a prolonged time, and for the other half, it was never turned on. In reality, the dial had no effect on the inhaled air, but this did not matter, as neither group of patients attempted to adjust it. However, only 20% of the perceived-control group experienced a panic attack, compared with 80% of the no-perceived-control group (see also Glass, Reim, & Singer, 1971, for related results in normal participants).

As the Sanderson et al. (1989) study illustrates, controllability models suggest that anxiety and depression are affected by perceptions that extend beyond actual control of external events or consequences to also stress the importance of perceived ability to control or carry out behaviors and thoughts. In studies that have examined individual differences in perceived control (i.e., self-efficacy) in depression, for example, Kanfer and Zeiss (1983) found that depressed college students differed from nondepressed ones in their efficacy for interpersonal functioning, but not in their self-held standards for successful functioning. Bandura, Pastorelli, Barbaranelli, and Caprara (1999) also found that low self-efficacy for academic and social tasks contributed to concurrent and subsequent depression in children. Importantly, efficacy beliefs rather than actual performance predicted concurrent depression. In fact, current depression, along with problem behavior and academic achievement, mediated the effect of self-efficacy on future depression. Kavanagh and Wilson (1989) also reported that efficacy beliefs regarding emotional coping skills were related (above and beyond the skills themselves) to improvement in cognitive therapy. Low self-efficacy also predicted relapse within 12 months (see also Usaf & Kavanagh, 1990, for related results in cognitive therapy for depression). Finally, tying together both the hopelessness and the self-efficacy models, Houston (1995) found that the interaction of low efficacy beliefs and a pessimistic attributional style predicted depression after a failure manipulation. In a chronically medically ill sample, Shnek et al. (1997) found that both helplessness and low self-efficacy predicted depression after controlling for other confounding variables.

Self-efficacy deficits would lead to depression when the

particular behavior a person feels unable to perform involves avoiding loss or failure. In contrast, self-efficacy deficits would lead to anxiety when the particular behavior a person feels unable to complete involves harm avoidance. Thus Bandura (1986) posited that it is low self-efficacy, or a perceived inability to cope, that makes people anxious. Indeed, self-efficacy theory was associated primarily with anxiety, and particularly with phobic reactions, for many years. The literature on the role of self-efficacy in anxiety has been reviewed recently (e.g., S. L. Williams, 1995). In general, self-efficacy beliefs appear to play a role in coping behaviors, negative affect, and anxiety. For example, Valentiner, Telch, Petruzzi, and Bolte (1996) found that self-efficacy beliefs predicted both subjective and physiological measures of fear in claustrophobics, even when other expectancies (e.g., expected anxiety levels) were partialed out (see also Zane & Williams, 1993). It should also be noted, however, that studies of self-efficacy rarely employ measures of perceived control from the related learned helplessness tradition to determine the relative utility of the two approaches.

Overall, both depressed and anxious individuals appear to hold a negative view of the future and to make assessments of personal inability to control negative outcomes or affect positive ones. This view appears both when content (e.g., beliefs and thoughts about the future) is assessed and when on-line judgments are produced (see the previous section titled "Judgmental or Interpretive Biases"). To some degree, these beliefs may be malleable through modeling, exposure, or similar processes (Mineka & Thomas, 1999).

Theories of Social Cognition and the Emotional Disorders

In this section, we reviewed the role of higher level social-cognitive structures and processes in the onset and maintenance of emotional disorders. Together, the various studies reviewed suggest a model of the social-cognitive personality of individuals susceptible to emotional distress and emotional disorders. To organize this section, we used Beck's (1967) negative cognitive triad framework, which posits the presence of unique self-, other-, and future-related cognitions. Indeed, we provided examples of cognitive biases that play a part in anxiety and depression within each of the triad's domains. In addition to Beck's framework, we characterized each of the studies reviewed here as reflective of either declarative cognition (i.e., content and structure) or procedural cognition (i.e., cognitive processes). By organizing the section according to these two frameworks, we intended to uncover gaps in the literature. Indeed, it is clear that certain areas (e.g., self-related cognitive content) have received extensive empirical attention but that other areas are relatively unexplored. Specifically, we located limited work on self-related processes (e.g., self-focused attention, goal-directed processes) and on self-related cognitive structures in clinical populations. Very little empirical attention has been given to other-related cognition in anxiety or depression. Finally, in each section, we have seen that depression has clearly received a far greater amount of attention than has anxiety and its disorders.

An additional challenge facing researchers who examine social-cognitive factors in anxiety and mood disorders is the need for greater methodological sophistication that will move the field beyond self-report methodology. Some of the areas reviewed here have already begun to incorporate more rigorous methods (e.g., the use by Kuiper and Derry [1982] of incidental recall in examining self-referential cognitive content or the use by Higgins and others of response latencies in examining regulatory foci). However, many of the somewhat tentative conclusions drawn here would be greatly strengthened by the adoption of additional experimental and measurement techniques that would obviate the possible confound inherent in self-reports.

As we noted earlier, biases in self-, other-, and future-related cognition are presumed to be learned. It is therefore not surprising that researchers who have identified these biases have gone on to develop cognitive interventions aimed at changing the cognitive schemata or altering the cognitive processes that play a part in psychopathology. Indeed, for more than 30 years, the social-cognitive approaches to psychopathology have given rise to a cognitive-learning model of psychotherapy (e.g., Beck, 1976). Application of these social-cognitive findings in the design of appropriate interventions is continuing. Recent developments include Seligman and colleagues' use of explanatory style training in the prevention of depression (e.g., Gillham, Reivich, Jaycox, & Seligman, 1995) and Strauman et al.'s self-system therapy program, which applies the findings on self-discrepancies to treatment of mood disorders. In addition to the inherent importance of such programs as effective interventions, they will provide important experimental information and will contribute to future understanding of the causal role of social-cognitive biases in depression and anxiety.

Summary

In the previous sections, we have reviewed major parts of the literature that explores the interplay between cognition and emotional disorders. The purpose of this chapter is not so much to offer a unifying framework for this interplay as to provide an update of the fruitful and important avenues of research that have been used to explore it. By necessity, we could not explore each of the various studies in great depth. However, we did choose to bring together here a wide spectrum of cognitive variables, rang-

ing from automatic, split-second biases in attention to idiosyncratic, longstanding, and often conscious expectancies and goals.

Both the basic cognitive biases and the higher level ones may precede, accompany, or result from emotional disorders. Nonetheless, we find two theoretical frameworks useful in understanding major portions of the broad set of findings. First, following a psychoevolutionary perspective (e.g., Gray, 1990; Plutchik, 1984), we believe emotion and emotional disorders have helped to organize certain aspects of lower level cognition. As such, somewhat distinct modes of information processing may have evolved to accompany anxiety versus depression. To a large degree, anxiety serves a future-oriented purpose of preparing for a possible upcoming dangerous situation. Therefore, a bias toward attending in a split-second, often automatic, fashion toward potentially threatening information may have been selected for. Depression, serving a past-oriented purpose, is accompanied by a bias toward great recall and elaborative processing of already-acquired information (cf. Mathews, 1993; J. M. G. Williams et al., 1988, 1997).

The second framework we employ is consistent with social-cognitive theories of emotion and psychopathology, as well as with appraisal models of stress, coping, and emotion. This framework highlights the role of higher level cognitive biases (i.e., the representation and processing of self-, other-, and future-related information) in the elicitation and maintenance of anxiety and depressive episodes. Specifically, these social-cognitive variables, such as attributional styles, self-focused attention, self-schemata, and future-event schemata, exert their influence by determining what aspects of a person's life are chronically salient, as well as which life events are appraised and how they are appraised (as moderate or severe, as self-relevant or irrelevant, etc.).

Although we have not attempted to provide a unified theoretical framework that could successfully merge the two already broad theoretical frameworks discussed here, we hope to have contributed to such future attempts by juxtaposing our discussion of low- and high-level cognitive biases in emotional disorders. Moreover, we firmly believe in the importance of further exploring both the information processing and the social-cognitive frameworks for understanding the vulnerability, maintenance, and treatment of emotional disorders. Such approaches are relatively unique in their ability to address psychological and phenomenological aspects of these all too prevalent psychopathological conditions.

NOTES

1. However, not all studies of high-trait-anxious participants have failed to find threat interference with supraliminal presentations on the emotional Stroop task (e.g., Broadbent & Broadbent, 1988).

2. Interestingly, a different pattern of results was obtained in the supraliminal condition of the emotional Stroop in this study that used semester examinations as the stressor. Indeed, when the high-trait-anxious participants were aware of the semantic content of the presented stimuli, there was a suppression of the interference effect for exam-relevant words, as in the Mathews and Sebastian (1993) study with snake phobics who had a snake nearby. See Mogg, Kentish, and Bradley (1993) for somewhat related results.

3. It should be noted, however, that in naturally occurring anxiety and depression, these studies usually involve both mood-congruent encoding and retrieval given that both encoding and retrieval usually occur in one experimental session.

4. J. M. G. Williams et al. (1997) did not cite the Bradley et al. (1995) or the C. MacLeod and McLaughlin (1995) studies.

5. One potential problem in interpreting the results of this study is that it is impossible to know whether the anxious individuals interpreted the ambiguous sentence in a threatening manner as they heard it (an on-line bias) or whether the bias occurred at the time they were asked to recognize which of several disambiguated interpretations was the one they heard (in which case a memory bias could be what was being displayed).

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