Eysenck, M.T. & Keane, M.T. (2000). Cognitive Psychology: A Student's Handbook (4th Ed.), Chapter 18. Philadelphia: Psychology Press

18

Cognition and Emotion

INTRODUCTION

Much of contemporary cognitive psychology is dominated by the computer analogy or metaphor. This has led to an emphasis on information-processing models. However, this approach does not lend itself readily to an examination of the relationship between cognition and emotion, in part because it is hard to think of computers as having emotional states.

Most cognitive psychologists have chosen to ignore the issue of the effects of emotion on cognition by trying to keep the emotional states of their participants constant. Why do they take this evasive action? In the words of Gardner (1985, p. 6), emotion is a factor "which may be important for cognitive functioning but whose inclusion at this point would unnecessarily complicate the cognitive-scientific enterprise."

In spite of this negative attitude, there is a growing volume of research on cognition and emotion. Some of that research, such as the role of emotional states in eyewitness testimony and autobiographical memory, was discussed earlier in the book (see Chapter 8). Probably the most common approach adopted by cognitive psychologists wishing to study the effects of emotion on cognition has involved manipulating participants' emotional states in a systematic way. In contrast, some researchers (e.g., Smith & Lazarus, 1993) have studied the effects of cognition on emotion. As there are almost constant interactions between cognition and emotion in everyday life, any attempt to provide an adequate theory of cognition that ignores emotion is likely to be inadequate.

Before proceeding, it is worth considering some definitions. The term "affect" is very broad, and has been used to cover a wide variety of experiences such as emotions, moods, and preferences. In contrast, the term "emotion" tends to be used to refer to fairly brief but intense experiences, although it is also used in a broader sense. Finally, "mood" or "state" describe low-intensity but more prolonged experiences.

DOES AFFECT REQUIRE COGNITION?

Suppose that a stimulus (e.g., a spider) is presented to someone, as a result of which his or her affective response to that stimulus changes. Is it essential

for the stimulus to be processed cognitively for the changed affective response to occur? This issue is of theoretical importance. If affective responses to all stimuli depend on cognitive processing, it follows that theories of emotion should have a distinctly cognitive flavour. In contrast, if cognitive processing is *not* necessary in the development of affective responses to stimuli, then a specifically cognitive approach to emotion may be less necessary.

Zajonc (1980, 1984) argued that the affective evaluation of stimuli can occur independently of cognitive processes. According to Zajonc (1984, p. 117), "affect and cognition are separate and partially independent systems and . . . although they ordinarily function conjointly, affect could be generated without a prior cognitive process." In contrast, Lazarus (1982, p. 1021) claimed that some cognitive processing is an essential prerequisite for an affective reaction to a stimulus to occur: "Cognitive appraisal (of meaning or significance) underlies and is an integral feature of all emotional states."

Zajonc's position

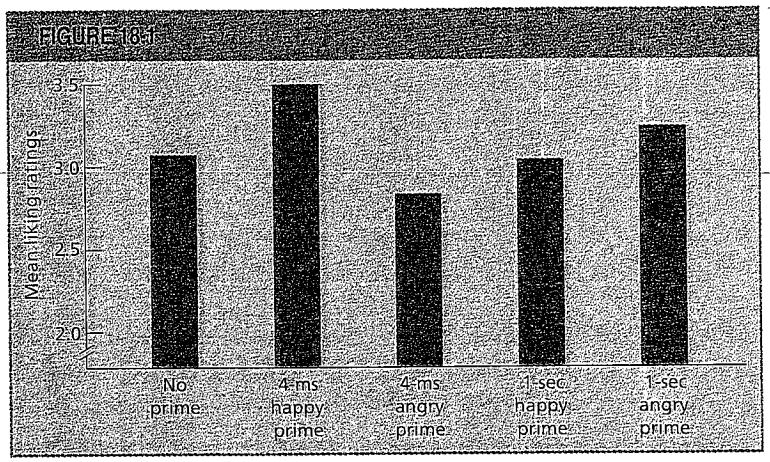
Zajonc (1980) claimed in his affective primacy hypothesis that we often make affective judgements about people and objects even though we have processed very little information about them. Zajonc discussed several studies supporting the notion of affective primacy. In these studies, stimuli such as melodies or pictures were presented either very briefly below the level of conscious awareness or while the participant was involved in a task. Even though these stimuli could not subsequently be recognised, participants were still more likely to choose previously presented stimuli than comparable new ones when asked to select the ones they preferred. Thus, there was a positive affective reaction to the previously presented stimuli (as assessed by their preference judgements), but no evidence of cognitive processing (as assessed by recognition-memory performance). This phenomenon is known as the *mere exposure effect*.

Studies on the mere exposure effect do not have much obvious relevance to ordinary emotional states. Participants make superficial preference judgements about fairly meaningless stimuli unrelated to their lives, and so no more than minimal affect is involved.

Another major limitation with these studies is that the conclusion that the stimuli had not been processed cognitively was based on a failure of recognition memory. This may make sense if one equates cognition with consciousness, but very few cognitive psychologists would do so. The data do not rule out the possibility that there was extensive pre-conscious processing involving automatic and other processes. Murphy and Zajonc (1993, p. 724) have accepted that the term "cognitive" can be used to refer to non-conscious processes: "We do not require either affect or cognition to be accessible to consciousness."

According to the affective primacy hypothesis, simple affective qualities of stimuli can be processed much faster than more cognitive ones. Murphy and Zajonc (1993) provided some support for this hypothesis in a series of priming studies. In these studies, a priming stimulus was presented for either 4 milliseconds or 1 second, and was followed by a second stimulus. In one study, the priming stimuli consisted of happy and angry faces, and there was a no-priming control condition. The priming stimuli were followed by Chinese ideographs which were given liking ratings. The findings are shown in Figure 18.1. The liking ratings were influenced by the affective primes when they were presented for only 4 milliseconds, but not when they were presented for 1 second. Presumably participants in the latter condition realised that their affective reaction was produced by the priming stimulus, and so that reaction did not influence their rating of the second stimulus.

In another study, Murphy and Zajonc (1993) required participants to make a cognitive judgement. Male or female priming faces were followed by Chinese ideographs, which were rated for femininity. These ratings were influenced by the priming faces when they were presented for 1 second, but not when they were presented for 4 milliseconds (see Figure 18.1). The various findings obtained by Murphy and Zajonc (1993) suggest the following conclusions:



Liking ratings for Chinese ideographs following the presentation of a happy or angry priming stimulus for 4 msec or 1 second. Based on data in Murphy and Zajonc (1993).

1. Affective processing can sometimes occur faster than cognitive processing.
2. The initial affective processing of a stimulus is very different from the later cognitive processing.

Lazarus's position

Lazarus (1982) argued that *cognitive appraisal* plays a crucial role in emotional experience. Cognitive appraisal can be subdivided into three more specific forms of appraisal:

- Primary appraisal: an environmental situation is regarded as being positive, stressful, or irrelevant to well-being.
- Secondary appraisal: account is taken of the resources that the individual has available to cope with the situation.
- Re-appraisal: the stimulus situation and the coping strategies are monitored, with the primary and secondary appraisals being modified if necessary.

The importance of cognitive appraisal in determining emotional experience has been shown in several studies by Lazarus and his associates (e.g., Speisman, Lazarus, Mordkoff, & Davison, 1964). One approach involves presenting an anxiety-evoking film under various conditions. One film showed a Stone Age ritual in which adolescent boys had their penises deeply cut, and another film showed various workshop accidents. The most dramatic of these accidents involves a board caught in a circular saw which rams with tremendous force through the midsection of a worker, who dies writhing on the floor. Cognitive appraisal was manipulated by varying the accompanying soundtrack, and then comparing the stress experienced against a control condition without a soundtrack. Denial was produced by indicating that the incision film did not show a painful operation, or that those involved in the workshop film were actors. Intellectualisation was produced in the incision film by considering matters from the perspective of an anthropologist viewing strange native customs, and was produced in the workshop film by telling the viewer to consider the situation in an objective way. Various psychophysiological measures of arousal or stress (e.g., heart rate; galvanic skin response) were taken continuously during the viewing of the film.

The major finding of Lazarus's studies was that denial and intellectualisation both produced substantial reductions in stress as indexed by the psychophysiological measures. Thus, manipulating an individual's cognitive appraisal when confronted by a stressful event can have a significant impact on physiological stress reactions. However, it has not always proved easy to replicate these findings (e.g., Steptoe & Vogele, 1986).

Smith and Lazarus (1993) adopted a rather different approach. They argued that there are six appraisal components, two of which involve primary appraisal and four of which involve secondary appraisal:

- Primary: motivational relevance (related to personal commitments?).
- Primary: motivational congruence (consistent with the individual's goals?).
- Secondary: accountability (who deserves the credit or blame?).
- Secondary: problem-focused coping potential (can the situation be resolved?).
- Secondary: emotion-focused coping potential (can the situation be handled psychologically?).
- Secondary: future expectancy (how likely is it that the situation will change?).

Smith and Lazarus (1993) argued that different emotional states can be distinguished on the basis of which appraisal components are involved. Thus, for example, anger, guilt, anxiety, and sadness all possess the primary appraisal components of motivational relevance and motivational incongruence (these emotions only occur when goals are blocked), but differ in terms of secondary appraisal components. Guilt involves self-accountability, anxiety involves low or uncertain emotion-focused coping potential, and sadness involves low future expectancy for change.

Smith and Lazarus (1993) used scenarios in which the participants were told to identify with the central character. In one scenario, the central character has performed poorly in an important course, and he appraises the situation. Other-accountability was produced by having him put the blame on the unhelpful teaching assistants; self-accountability was produced by having him argue that he made a lot of mistakes (e.g., doing work at the last minute); low emotion-focused coping potential was produced by thinking that there was a great danger that he would finish with a poor academic record; and low future expectancy for change was produced by having him think that it was impossible to succeed with his chosen academic path. The appraisal manipulations generally had the predicted effects on the emotional states reported by the participants, indicating that there are close links between appraisal on the one hand and experienced emotion on the other hand.

Lazarus (e.g., 1982) has argued consistently that cognitive appraisal always precedes any affective reaction, but that such appraisal may not be at the conscious level. However, the notion that pre-conscious cognitive processes determine affective reactions is often no more than an article of faith. However, the literature on subliminal perception suggests that there are important pre-conscious cognitive processes.

Evaluation

Appraisal processes are important in determining our emotional reactions to stimuli. However, the notion of appraisal is rather broad and vague, and so it can be hard to assess an individual's appraisals. For example, Lazarus (1991, p. 169) referred to "two kinds of appraisal processes—one that operates automatically without awareness or volitional control, and another that is conscious, deliberate, and volitional."

Parkinson and Manstead (1992) argued that there are several problems of interpretation with studies such as the one by Speisman et al. (1964). In essence, the soundtrack manipulations may not have had a direct impact on the appraisal process. Changing the soundtrack changed the stimulus information presented to the participants, and different soundtracks may have influenced the direction of attention rather than the interpretive process itself. More generally, Parkinson and Manstead (1992, p. 146) argued that Lazarus's approach represents a rather limited view of emotion: "Appraisal theory has taken the paradigm [model] of emotional experience as an individual passive subject confronting a survival-threatening stimulus." Thus, Lazarus's approach de-emphasises the social context in which emotion is normally experienced.

Conclusions

Zajonc (1980) and others have provided evidence that affective responses can occur in the absence of any conscious awareness of cognitive processing, and Lazarus (1982) does not dispute that this is possible. As Williams, Watts, MacLeod, and Mathews (1997, p. 3) pointed out, "There would . . . be fairly wide support for a reformulated version of Zajonc's thesis that emotion can be independent of *conscious* cognitive processes."

Several theorists have argued that this dispute between Zajonc and Lazarus is based on a false assumption. In the words of Power and Dalgleish (1997, p. 67), "The distinction presupposed in the Zajonc–Lazarus debate between cognition and emotion is a false one . . . The 'emotion' and the 'cognition' are integral and inseparable parts of each other and though it is useful to use different names for different aspects of the generation of emotion, the parts are no more separable than are waves from the water on which they occur." This view may exaggerate the similarities between emotion and cognition.

Multi-level theories

Progress in understanding how stimuli produce emotional reactions is most likely to occur when we have theories specifying the intervening processes. Two recent multi-level theories (those of LeDoux, 1992, 1996, and of Power & Dalgleish, 1997) are of value in this regard.

LeDoux (e.g., 1992, 1996) has focused exclusively on anxiety in his research. He has emphasised the role of the amgydala, which he regards as the brain's "emotional computer" for working out the emotional significance of stimuli. According to LeDoux, sensory information about emotional stimuli is relayed from the thalamus simultaneously to the amgydala and to the cortex. Of key relevance here, LeDoux (1992, 1996) argues that there are two different emotion circuits in anxiety:

1. A slow-acting thalamus-to-cortex-to-amygdala circuit involving detailed analysis of sensory information.
2. A fast-acting thalamus-amygdala circuit based on simple stimulus features (e.g., intensity); this circuit bypasses the cortex.

LeDoux (1992, p. 275) related his theory to the Zajonc–Lazarus debate:

> The activation of the amygdala by inputs from the neocortex is . . . consistent with the classic notion that emotional processing is postcognitive, whereas the activation of the amygdala by thalamic inputs is consistent with the hypothesis, advanced by Zajonc (1980), that emotional processing can be preconscious and precognitive.

Why do we have two emotion circuits? The thalamus-amygdala circuit allows us to respond rapidly in threatening situations, and thus can be valuable in ensuring our survival. In contrast, the cortical circuit produces a detailed evaluation of the emotional significance of the situation, and so allows us to respond to situations in the most appropriate fashion.

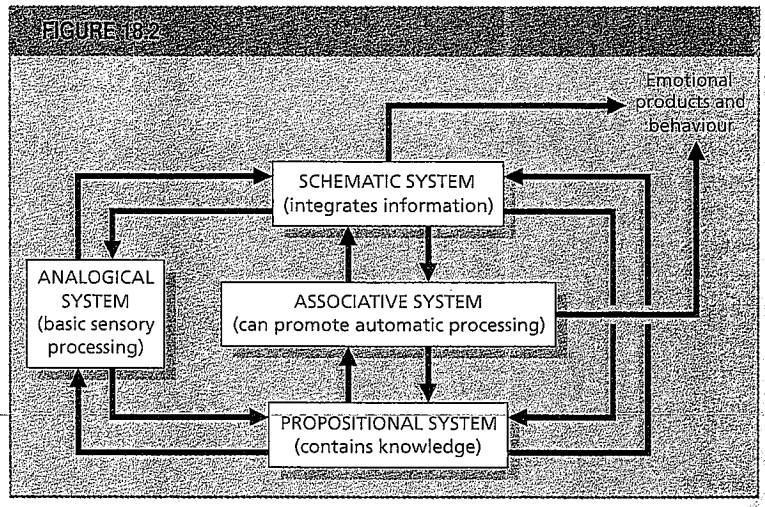
Power and Dalgleish (1997) put forward a Schematic Propositional Associative and Analogical Representational Systems (SPAARS) approach, which is shown in Figure 18.2. The various components of the model are as follows:

- Analogical system: this is involved in basic sensory processing of environmental stimuli.
- Propositional system: this is an essentially emotion-free system which contains information about the world and about the self.
- Schematic system: within this system, facts from the propositional system are combined with information about the individual's current goals to produce an internal model of the situation. This will lead to an emotional response if the current goals are being thwarted.
- Associative system: its workings were described by Dalgleish (1998, p. 492): "If the same event is repeatedly processed in the same way at the schematic level, then an associative representation will be formed such that, on future encounters of the same event, the relevant emotion will be *automatically* elicited."

The SPAARS approach has some relevance to the Zajonc–Lazarus debate. According to Power and Dalgleish (1998), there are two main ways in which emotion can occur. First, it can occur as a result of thorough cognitive processing when the schematic system is involved. Second, it occurs automatically and without the involvement of conscious processing when the associative system is involved.

How does the schematic system use information about current goals to decide on the precise

FIGURE 18.2



The Schematic Propositional Associative and Analogical Representational Systems (SPAARS) approach put forward by Power and Dalgleish (1997).

emotion that is appropriate in a given situation? Power and Dalgleish (1997) made use of an earlier theory of Oatley and Johnson-Laird (1987), according to which there are five basic emotions. Each of these emotions occurs at a key juncture with respect to a current goal or plan:

1. Happiness: progress has been made on a current goal.
2. Anxiety: the goal of self-preservation is threatened.
3. Sadness: the current goal cannot be achieved.
4. Anger: the current goal is frustrated or blocked.
5. Disgust: a gustatory [taste] goal is violated.

There is reasonable evidence from cross-cultural studies of facial expressions of emotion, emotional development in children, and so on that these are indeed the five most basic emotions (see Power & Dalgleish, 1997). Complex emotions involve different combinations of these basic emotions.

Evaluation

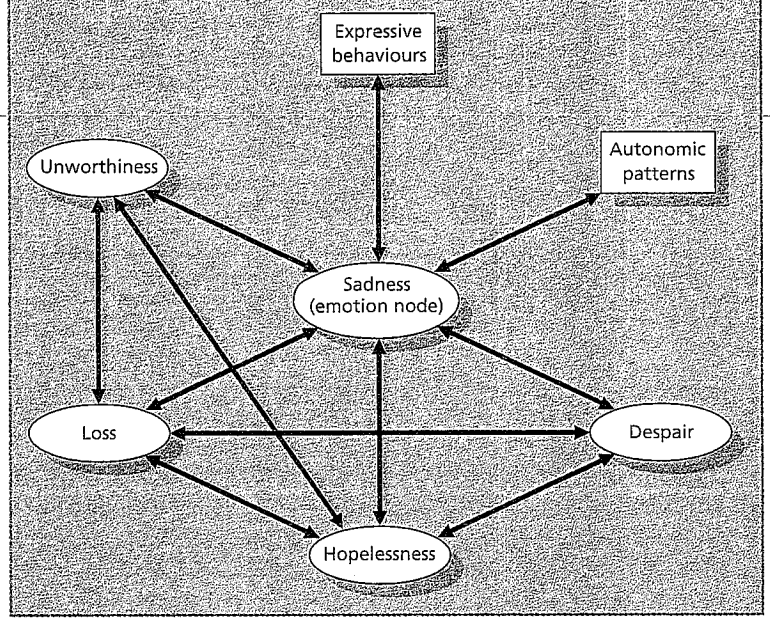
Multi-level theories of emotion have the advantage that they can provide explanations for emotional conflict. For example, individuals with spider phobia become very frightened when they see a spider even though they may "know" that most spiders are harmless. LeDoux could explain this conflict by assuming that the fear is produced by the fast-acting system, whereas the conflicting knowledge is produced by the slow-acting system. In the SPAARS approach, fear could be generated by the associative system, and the conflicting knowledge could come from the propositional and schematic systems.

THEORIES OF EMOTIONAL PROCESSING

We have seen that there may well be five basic emotions. However, theory and research on emotional processing have focused mainly on anxiety and depression, with some attention being paid to happiness, and practically none to anger and disgust. This imbalance is reflected in our discussion of emotional processing.

Some theories of emotional processing have focused on the effects of *mood* on emotional processing, whereas others deal with the effects of *personality* on emotional processing. However, there is overlap between the two types of theory. For example, we might want to consider the influence of *trait anxiety* (a personality dimension related to individual differences in susceptibility to anxiety). If we carry out a study, then those participants who are high in trait anxiety will probably be in a more anxious mood state than those

FIGURE 18.3



Bower's semantic network theory. The ovals represent nodes or units within the network. Adapted from Bower (1981).

low in trait anxiety. In such a case, it is hard to disentangle the effects of personality from those of mood.

In this section, we consider theories put forward by Bower (1981), by Beck (1976), and by Williams, Watts, MacLeod, and Mathews (1988, 1997). Bower's network theory has been influential within the area of mood and emotional processing, Beck's schema theory has dominated research on personality and emotional processing, and the theory of Williams et al. builds on these earlier theories.

Bower's network theory

Some of the key features of the network theory proposed by Bower and his associates (e.g., Bower, 1981; Gilligan & Bower, 1984) are shown in Figure 18.3. The theory as expressed by Gilligan and Bower (1984) makes six assumptions:

- Emotions are units or nodes in a semantic network, with numerous connections to related ideas, to physiological systems, to events, and to muscular and expressive patterns.
- Emotional material is stored in the semantic network in the form of propositions or assertions.
- Thought occurs via the activation of nodes within the semantic network.
- Nodes can be activated by external or by internal stimuli.
- Activation from an activated node spreads to related nodes. This assumption is crucial, because it means that activation of an emotion node (e.g., sadness) leads to activation of emotion-related nodes or concepts (e.g., loss; despair) in the semantic network.
- "Consciouness" consists of a network of nodes activated above some threshold value.

These assumptions lead to the following hypotheses:

- Mood-state-dependent recall: recall is best when the mood at recall matches that at the time of learning.
- Mood congruity: emotionally toned information is learned best when there is correspondence between its affective value and the learner's current mood state.
- Thought congruity: an individual's free associations, interpretations, thoughts, and judgements tend to be thematically congruent with his or her mood state.

- Mood intensity: increases in intensity of mood cause increases in the activation of associated nodes in the associative network.

How exactly do the four hypotheses relate to the six theoretical assumptions? So far as mood-state-dependent recall is concerned, associations are formed at the time of learning between the activated nodes representing the to-be-remembered items and the emotion node or nodes activated because of the participant's mood state. At the time of recall, the mood state at that time leads to activation of the appropriate emotion node. Activation then spreads from that emotion node to the various nodes associated with it. If there is a match between the mood state at learning and at recall, then this increases activation of the nodes of to-be-remembered items, and leads to enhanced recall. However, the associative links between the to-be-remembered stimulus material and the relevant emotion node are likely to be relatively weak. As a result, mood-state-dependent effects are likely to be greater when the memory test is a difficult one offering few retrieval cues (e.g., free recall) than when it provides strong retrieval cues (e.g., recognition memory).

Mood-state-dependent effects are also predicted by other theories. According to Tulving's encoding specificity principle (see Chapter 6), the success of recall or recognition depends on the extent to which the information available at the time of retrieval matches the information stored in memory. If information about the mood state at the time of learning is stored in memory, then being in the same mood state at the time of retrieval increases this information matching. Theoretically, this should increase both recall and recognition.

Thought congruity occurs for two reasons. First, the current mood state leads to activation of the corresponding emotion node. Second, activation spreads from that emotion node to other, associated related nodes, which will tend to contain information emotionally congruent with the activated emotion node.

Mood congruity occurs when people in a good mood learn and remember emotionally positive material better than those in a bad mood, whereas the opposite is the true for emotionally negative material. According to Gilligan and Bower (1984), mood congruity depends on the fact that emotionally loaded information tends to be associated more strongly with its congruent emotion node than with any other emotion node. For example, those nodes containing information about sadness-provoking events and experiences are associatively linked to the emotion node for sadness (see Figure 18.3). To-be-remembered material that is congruent with the current mood state links up with this associative network of similar information. This leads to extensive or elaborative encoding of the to-be-remembered material. As we saw in Chapter 6, elaborative encoding is generally associated with superior long-term memory.

One might assume that the effects described here would become stronger as the intensity of the current mood increases. The reason is that the spread of activation from the activated emotion node to other related nodes would increase in line with the intensity with which emotion was experienced. However, a very sad mood may lead to a focus on internal information relating to failure, fatigue, and so on, and this may inhibit processing of all kinds of external stimuli whether or not they are congruent with the sad mood state.

Mood states

It is hard to ensure that participants are in the appropriate mood state. One method is to try to induce the required mood state under laboratory conditions, and another is to make use of naturally occurring mood states (e.g., in patients with mood disorders).

The most popular mood-induction approach is based on the procedure introduced by Velten (1968). Participants read a set of sentences designed to induce increasingly intense feelings of elation or depression. Participants typically report that their mood has altered as expected, but they may simply be responding as they believe the experimenter wants them to. A further problem is that this mood-induction procedure usually produces a blend of several mood states rather than just the desired one (Polivy, 1981).

Bower (e.g., Bower, Gilligan, & Monteiro, 1981; Bower & Mayer, 1985) has used hypnosis combined with self-generated imagery. When in the hypnotic state, participants are asked to think of images of a past happy or sad emotional experience, using those images to produce the appropriate mood state. This approach produces strong and long-lasting moods. However, it is necessary to use participants who score highly on tests of hypnotic susceptibility, and it may be unwise to generalise from such participants to other people.

Evaluation

Bower's network theory is clearly oversimplified. Emotions or moods and cognitive concepts are both represented as nodes within a semantic network. In reality, however, moods and cognitions are very different. For example, moods tend to change slowly in intensity, whereas cognitions tend to be all-or-none, and there is often rapid change from one cognition to another. As Power and Dalgleish (1997, p. 74) pertinently remarked, "A theory that gives emotion the same status as individual words or concepts is theoretically confused."

Beck's schema theory

Beck (1976) put forward a different theoretical approach to that of Bower, and this approach was developed by Beck and Clark (1988). The essence of this approach is that some individuals have greater vulnerability than others to developing depressive or anxiety disorders. Such vulnerability depends on the formation in early life of certain *schemas* or organised knowledge structures (see Chapter 9). According to Beck and Clark (1988, p. 26):

> The schematic organisation of the clinically depressed individual is dominated by an overwhelming negativity. A negative cognitive trait is evident in the depressed person's view of the self, word and future . . . In contrast the maladaptive schemas in the anxious patient involve perceived physical or psychological threat to one's personal domain as well as an exaggerated sense of vulnerability.

Beck and Clark (1988) assumed that schemas influence most cognitive processes such as attention, perception, learning, and retrieval of information. Schemas produce processing biases in which the processing of schema-consistent or emotionally congruent information is favoured. Thus, individuals with anxiety-related schemas should selectively process threatening information, and those with depressive schemas should selectively process emotionally negative information. While Beck and Clark (1988) emphasised the role of schemas in producing processing biases, they claimed that schemas would only become active and influence processing when the individual is an anxious or depressed state.

Beck's schema theory was originally intended to provide a framework for understanding clinical anxiety and depression. However, it can readily be applied to personality research. For example, Eysenck (1992, 1997) argued that normal individuals high in trait anxiety possess danger or vulnerability schemas leading them to favour the processing of threat-related information, especially when they are feeling anxious.

Evaluation

The notion that some individuals have schemas that predispose them towards clinical anxiety or depression is a valuable one. However, it has proved hard to show that such schemas play a *causal* role in the development of anxiety disorders or depression. Some weaknesses in Beck's approach were identified by Eysenck (1997, pp. 95–96):

> First, the central theoretical construct of 'schema' is amorphous [vague], and often seems to mean little more than 'belief'. Second, the evidence for the existence of specific schemas is often based on a circular argument. Behavioural evidence of a cognitive bias in anxious patients is used to infer the presence of a schema, and then that schema is used to 'explain' the observed cognitive bias. In other words, there is generally no direct or independent evidence of the existence of a schema.

Comparison of approaches

On the face of it, Bower's network theory and Beck's schema theory are very different. For example, the emphasis within network theory is on the transient effects of mood on information processing via low-level processes in long-term memory, whereas the focus in schema theory is on the semi-permanent effects of schemas on information processing via high-level processes in long-term memory. However, as MacLeod (1990, p. 15) pointed out, the two theories or models

> make parallel predictions concerning the relationship between emotion and cognition . . . Both the schema model and the network model of emotion and cognition predict the existence of pervasive processing biases, associated with both anxiety and depression, affecting the encoding, comprehension and retrieval of emotionally valenced [loaded] information. Such biases should operate to favour consistently the processing of emotionally congruent information.

Williams et al. (1988, 1997)

Williams et al. (1988) focused on the effects of anxiety and depression on emotional processing. Their starting point was the distinction between priming and elaboration originally proposed by Graf and Mandler (1984). Priming is an automatic process in which a stimulus word produces activation of its various components in long-term memory, whereas elaboration is a later strategic process involving the activation of related concepts. According to the theory, anxious individuals show initial priming of threat-related stimuli, and so have an attentional bias towards threat. In contrast, depressed individuals show elaboration of threat-related stimuli, and so have a memory bias in which they find it easier to retrieve threatening than neutral material.

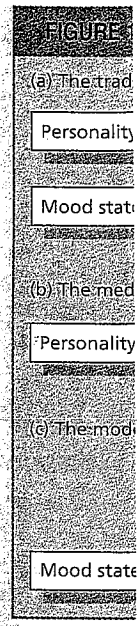
Some of the main predictions made by Williams et al. (1988) concern the effects of anxiety and depression on explicit and implicit memory. *Explicit memory* involves conscious recollection of past events, and presumably involves elaborative processes. In contrast, *implicit memory* does not involve conscious recollection, and may depend mainly on priming or automatic processes (see Chapter 7). Depressed individuals should show an explicit memory bias favouring retrieval of threatening material, whereas anxious individuals should show an implicit memory bias for threatening material.

Williams et al. (1997) developed their previous theory in various ways. They argued that the different functions of anxiety and depression have implications for information processing. Anxiety has the function of anticipating danger. As a result, it is "associated with a tendency to give priority to processing threatening stimuli; the encoding involved is predominantly perceptual rather than conceptual in nature" (Williams et al., 1997, p. 307). In contrast, if depression involves the replacement of failed goals, "then the conceptual processing of internally generated material related to failure or loss may be more relevant to this function than perceptual vigilance" (Williams et al., 1997, p. 315).

Williams et al. (1997) made use of Roediger's (1990) distinction between perceptual and conceptual processes (see Chapter 7). Perceptual processes are essentially *data-driven processes*, and are typically involved in basic attentional processes and in implicit memory. In contrast, conceptual processes are *top-down processes*, and are typically involved in explicit memory. Suppose we assume that anxiety facilitates the perceptual processing of threat-related stimuli, whereas depression facilitates the conceptual processing of threatening information. This would lead to the prediction of an implicit memory bias associated with anxiety and an explicit memory bias associated with depression.

Evaluation

The greatest strength of the Williams et al. approach is that it is based on an analysis of the functional differences between anxiety and depression. This leads Williams et al. to predict that the pattern of cognitive biases will differ between anxious and depressed individuals. This contrasts with the approaches of Beck and of Bower, both of whom predict the existence of global cognitive



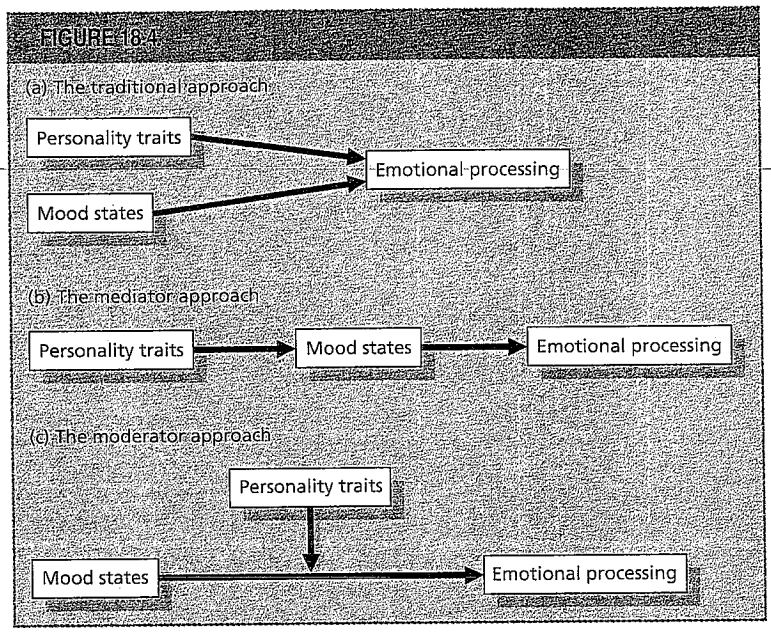


FIGURE 18.4

Three theoretical approaches to the effects of personality traits and mood states on emotional processing. Adapted from Rusting (1998).

biases applying to all emotional states. As we will see, the evidence is more supportive of the Williams et al. view. However, the differences in cognitive biases between anxious and depressed individuals are less clear-cut than predicted theoretically. Thus, even the revised theory of Williams et al. is oversimplified.

Rusting's approach

Rusting (1998) distinguished between mood-state and trait approaches, with Bower's network theory exemplifying a mood-state theory and Beck's schema theory being a prominent trait theory. She argued that there are three main ways in which emotional processing may be affected by traits and mood states (see Figure 18.4):

1. The traditional approach: personality traits and mood states have separate or independent effects on emotional processing.
2. The mediator approach: apparent effects of personality on emotional processing are indirect: personality affects mood state, and mood state influences emotional processing.
3. The moderator approach: the effects of mood states on emotional processing are moderated or influenced by personality traits. There should be significant *interactions* between traits and states in determining emotional processing, indicating their joint influences. This approach was adopted by Williams et al. (1988, 1997), and a similar approach was favoured by Beck and Clark (1988).

Two points need to be made here. First, most studies have been concerned with personality traits or with mood states, but not with both together. Thus, such studies cannot provide direct evidence on the mediator or moderator approaches. Second, studies on mood and emotional processing have mostly focused on learning and memory, whereas studies on personality and emotional processing have often focused on attention and perception. Our review of the evidence reflects these imbalances.

EMOTION AND MEMORY

There is some support for all four hypotheses put forward by Gilligan and Bower (1984, see earlier). The strongest support has been for mood

FIGURE 18.5

Mood state at learning	Mood state at recall	Predicted level of recall
Happy	Happy	High
Happy	Sad	Low
Sad	Happy	Low
Sad	Sad	High

Design for a study of mood-state-dependent memory together with the predicted results on Bower's (1981) theory.

congruity (i.e., learning is best when the participant's mood matches the emotional tone of the to-be-learned material). However, there have been several failures to show mood-state-dependent recall, thought congruity, mood congruity, and effects of mood intensity.

Mood-state-dependent memory

Experimental studies testing for mood-state-dependent memory typically make use of learning either one or two lists of words. Learning occurs in one mood state (e.g., happy or sad), and recall occurs in the same mood state or in a different one (see Figure 18.5). When two lists are presented (e.g., Bower, Monteiro, & Gilligan, 1978; Schare, Lisman, & Spear, 1984), one list is learned in one mood and the other list is learned in a different mood. Subsequently participants are put back into one of these two moods, and instructed to recall only the list learned first. It is predicted that recall should be higher when the mood state at the time of recall is the same as that at the time of learning.

Schare et al. (1984) and Bower et al. (1978) obtained mood-state-dependent recall with the two-list design but not with the one-list design. Perhaps participants trying to recall the first list with the mood appropriate to the second list thought of some of the words from the second list, and this interfered with the task of recalling first-list words.

Eich, Macaulay, and Lam (1997) reported interesting evidence of mood-state-dependent memory in patients suffering from bipolar disorder. They were initially given the task of thinking of autobiographical events to cues when in a depressed or manic mood. They were then asked to recall as many as possible of these events a few days later. When the patients' mood was the same on both occasions, an average of 33% of the autobiographical events could be recalled. This compared to only 23% when there had been a mood change between testing sessions.

Ucros (1989) reviewed 40 published studies of mood-state-dependent memory. The evidence revealed a moderate tendency for people to remember material better when there is a match between the mood at learning and at retrieval. However, the effects are generally stronger when participants are in a positive mood rather than a negative one. They are also greater when people try to remember personal events than when the learning material lacks personal relevance. Possible explanations for these effects are discussed later.

Kenealy (1997) noted various problems with research on mood-state-dependent memory. First, the level of learning was not established in most studies. As a result, it is not clear whether poor performance reflects deficient memory or deficient learning. Second, there was no check in some studies that the mood manipulations had been successful. Third, only one memory test was used in most studies. However, the extent of any mood-state-dependent effects on memory may depend on the nature of the memory test. For example, Kihlstrom (1991) suggested that the effects of mood state will be weaker when rich and informative cues are provided within the retrieval environment.

Kenealy (1997) addressed all these issues in a series of experiments producing strong evidence for mood-state-dependent memory. In one study, the participants looked at a map and learned a set of instructions concerning a particular route until their learning performance exceeded 80%. The following day they were given tests of free

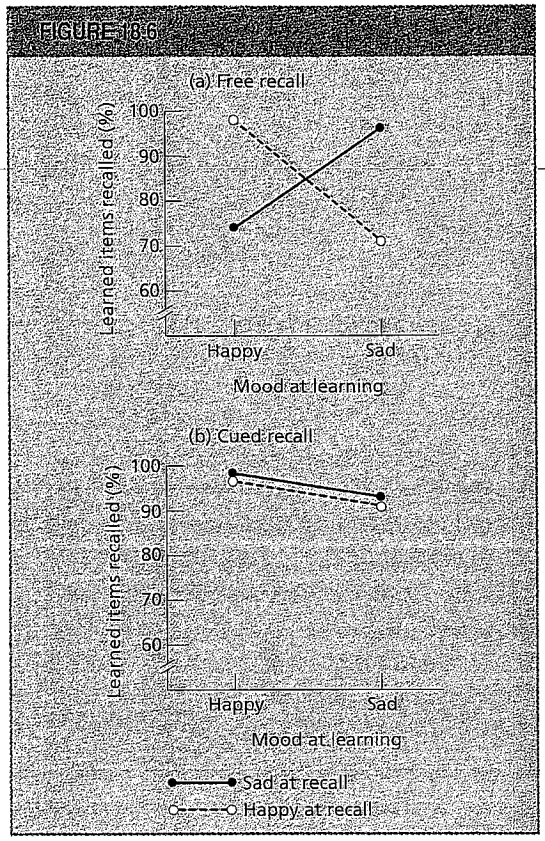


FIGURE 18.6

Free and cued recall as a function of mood state (happy or sad) at learning and at recall. Based on data in Kenealy (1997).

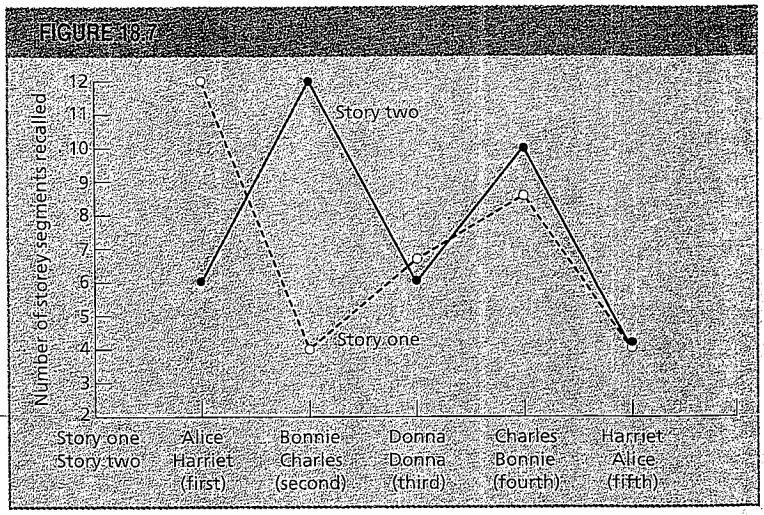
recall and cued recall (the visual outline of the map). There were strong mood-state-dependent effects in free recall, but not in cued recall (see Figure 18.6). Thus, mood state can affect memory even when learning is controlled, but does so only when no other powerful retrieval cues are available.

Most studies have focused on *explicit memory* involving conscious recollection of previous events. However, Macaulay, Ryan, and Eich (1993) found that mood-state-dependent effects can also be obtained on tests of implicit memory, on which conscious recollection is not required. Relevant evidence was reported by Nissen et al. (1988). They studied explicit and implicit memory in a 45-year-old woman suffering from multiple personality disorder, each of whose separate personalities can be regarded as corresponding to a different mood state.

The woman studied by Nissen et al. (1988) showed 22 different personalities ranging in age from 5 to 45. One of her personalities was Alice, who was 39 years old, studying to be a ministerial counsellor, and who worked as a nurses' assistant. Another of her personalities was Charles, who was 45 years old and an aggressive heavy drinker, and a third personality was Bonnie, 36, who was very social and whose main interests were in the theatre. There were striking personality-dependent effects on some tasks. The same story was read to five of the personalities in turn, with each personality providing almost immediate recall. There was no systematic improvement in recall across personalities (see Figure 18.7). On another task, memory for words was tested by means of an implicit memory test (word completion) and an explicit memory test (recall). Performance on both tests was much worse when the personality at the time of test was different from the personality at learning. In contrast, recognition memory for faces was almost as good when the personality changed between learning and test as when it remained the same (42% vs. 52%, respectively). Finally, there was an implicit task in which repeated and non-repeated words had to be identified from very brief presentations. Donna performed this task, then Charles, and then Donna again. Donna's performance on the repeated words was much better after Charles had performed the task than beforehand.

The findings from this woman produced evidence of strong personality-dependent effects with some explicit and implicit memory tasks, but weak or non-existent personality-dependent effects with other explicit and implicit memory tasks. Nissen et al. (1988, p. 131) accounted for the findings as follows:

> Material that allows a variety of different interpretations or whose encoding is significantly guided by strategic processing, or whose interpretation might be expected to depend on one's mood and beliefs and biases is relatively inaccessible across personalities.



Memory-performance-in-a-woman suffering from multiple personality disorder. Based on data in Nissen et al. (1988).

It should be noted in conclusion that the whole notion of multiple personality disorder remains controversial. More research is needed to prove (or disprove) its existence.

Mood congruity

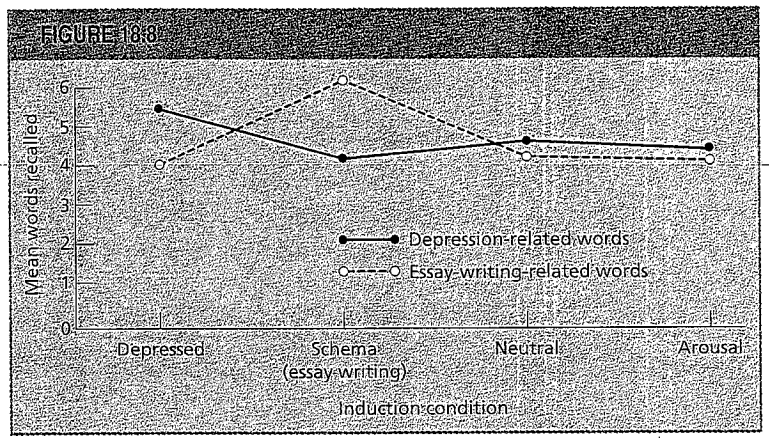
There is more experimental support for mood congruity than for any of the other hypotheses put forward by Gilligan and Bower (1984). The usual procedure is that a mood is induced, followed by the learning of a list or the reading of a story containing emotionally toned material. There is then a memory test for the list or the story after the participant's mood has returned to normal. Mood congruity is shown by recall being greatest when the affective value of the to-be-learned material matches the participant's mood state at the time of learning.

Bower et al. (1981) studied mood congruity. Participants who had been hypnotised to feel happy or sad read a story about two college men, Jack and André. Jack is very depressed and glum, because he is having problems with his academic work, with his girl-friend, and with his tennis. In contrast, André is very happy, because things are going very well for him in all three areas. Participants identified more with the story character whose mood resembled their own while they were reading the story, and recalled more information about him. Unfortunately, it has proved difficult to replicate these findings (Bower, 1987).

Kwiatkowski and Parkinson (1994) compared memory performance in naturally depressed participants and in participants who received a depressed mood induction but were not naturally depressed. Mood congruity occurred *only* in the naturally depressed group. As Kwiatkowski and Parkinson (1994, p. 232) concluded, "The present study suggests important qualitative differences between the two types of depression."

Perrig and Perrig (1988) instructed their participants to behave as if they were depressed or happy, but no attempt was made to induce any mood state. These instructions were followed by a word list containing positive, negative, and neutral words, which then had to be recalled. Those participants indicating an awareness of mood-congruity effects produced results very similar to those obtained by Bower et al. (1981), whereas those who did not showed no evidence of selective learning.

One interpretation of Perrig and Perrig's findings is that the participants were simply behaving as they thought the experimenter wanted them to behave. Perhaps the mood-congruity effects obtained in mood-induction studies merely reflect a desire on the part of participants to do what is expected. A more plausible interpretation was offered by Perrig and Perrig (1988, p. 102): "Mood



Free recall of depression-related and essay-writing-related words in four conditions: depressed mood induction; arousal induction; neutral mood induction; and schema induction. Adapted from Varner and Ellis (1998).

may be a sufficient but not a necessary condition to produce the mood-congruity effect of selective learning." Thus, mood-congruity effects can be produced either by genuine mood induction or by mood simulation.

Mood states produce changes in physiological arousal as well as in cognitive activity. Bower (1981) assumed that the cognitive changes were responsible for mood congruity, but it is possible that mood congruity actually depends on the arousal changes. Varner and Ellis (1998) compared these possibilities in two experiments in which the participants were presented with a list of words, some of which were associated with being depressed and the rest of which were related to the organisation of skills when writing an essay. There were four conditions: depressed mood induction; arousal induction (stepping up and down on a wooden platform); neutral mood induction; and schema induction (reading statements relevant to writing an essay). After the list had been presented, there was a test of free recall.

What were the findings? Mood congruity was found in the depressed mood induction condition, but not in the arousal induction condition (see Figure 18.8). Evidence that cognitive processes in the absence of physiological arousal can produce selective recall was found in the schema induction condition. Varner and Ellis (1998) obtained similar findings in a second experiment, in which the various induction procedures were used after learning but before recall. Thus, mood congruity can affect retrieval as well as learning. Varner and Ellis (1998, p. 947) concluded as follows: "Taken as a whole, the findings indicate that cognitive activity is of central import to the occurrence of mood-congruent processing and that arousal has little or no impact on the selective processing of mood-related information."

Thought congruity

Thought congruity has been studied in various ways. One method is to present participants with a list of pleasant and unpleasant words prior to mood induction, and then to test for recall after mood induction. The prediction is that pleasant words will be recalled better after pleasant mood induction than after unpleasant mood induction, with the opposite being the case for unpleasant words. Another method is to ask participants to recall autobiographical memories following mood induction. Pleasant moods should increase the number of pleasant memories recalled, and perhaps the speed with which they are recalled, and unpleasant moods should do the same for unpleasant memories.

Thought congruity has been shown in various studies using both of the methods just described (see Blaney, 1986, for a review). For example, Clark and Teasdale (1982) tested depressed patients on two occasions, with the depth of the depression being more severe on one occasion than on the other. More depressing or

unhappy memories and fewer happy memories were recalled on the more depressed occasion, with the opposite being the case on the less depressed occasion: These findings are consistent with the notion of a vicious circle in depressed patients: depressed mood state leads to recall of depressing memories, and the recall of depressing memories exacerbates the depressed mood state.

Mood intensity

There has been relatively little work on the mood intensity hypothesis. However, Rinck, Glowalla, and Schneider (1992) considered a related issue, namely, the emotional intensity of the stimulus material. Participants who were put into a happy or sad mood rated words in terms of their pleasantness–unpleasantness. There was a mood-congruency effect for the intensely emotional words (i.e., strongly pleasant or unpleasant) on a later unexpected recall test, but this effect was not found for the weakly emotional words.

Evaluation

Bower's network theory has provided a focus for research on mood and memory. Although the findings are somewhat inconsistent, the effects of mood on learning and memory generally resemble those predicted. However, the findings pose some problems for the theory. First, negative moods have often failed to enhance the learning and recall of negative material. This was shown most strikingly by Williams and Broadbent (1986) in a study on thought congruity. They studied the retrieval of autobiographical memories to positive and negative cue words by individuals who had recently attempted suicide by overdose. The suicide attempters were slower than normal controls to retrieve personal memories to the positive cue words, but were no faster than normals in thinking of negative personal experiences. Presumably it was so painful for the suicide attempters to retrieve unpleasant personal memories that they inhibited the retrieval of such memories. Second, mood-state effects are strongest when participants learn and remember personal events (Ucros, 1989). It is not clear on Bower's (1981) original network theory why this should be so.

Other theoretical perspectives

In the years since Bower (1981) put forward his network theory, there have been various attempts to provide more adequate theoretical accounts of mood and memory. Bower (1992) offered an explanation of why mood-state effects are greatest when personal events are learned and remembered. He argued for a causal belongingness hypothesis. According to this hypothesis, memory is only affected by mood state when participants believe that their emotional state at learning is *caused* by the to-be-learned stimuli. Causal attribution leads to an effective association between the stimulus and the emotional state. This is much more likely to occur with personal events (e.g., feeling delighted after succeeding in an important examination) than when an emotional state is induced before presenting the learning task.

Eich and Metcalfe (1989) argued that mood state has more effect on *internal* events such as reasoning or imagination than on events that are more closely determined by *external* factors. Thus, memory for internal events is more susceptible to mood effects than is memory for external events. They tested this hypothesis in two ways. First, participants who had been put into a happy or sad mood were given either a read task or a generate task. The read task involved reading a category name followed by two exemplars (e.g., precious metals: silver–*gold*), whereas the generate task required participants to complete the last word (e.g., precious metals: silver–g . . . ?). It was assumed that internal events would be more important with the generate task than with the read task. Second, memory was tested with either free recall or recognition, and it was assumed that free recall would place more demands on internal events than would recognition memory. Thus, it was predicted that mood-state-dependent effects would be greater with the generate condition than with the read condition and with free recall than with recognition memory.

The main findings were in line with the predictions (see Figure 18.9). Mood-state-dependent

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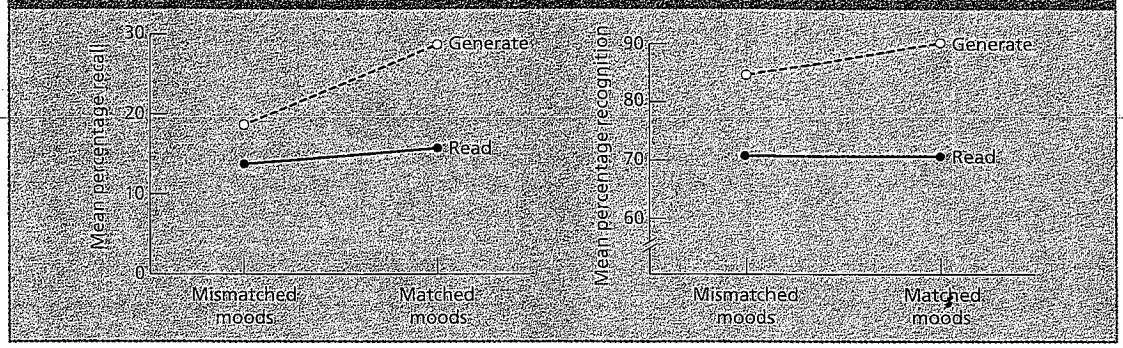


Memory performance (recall and recognition) as a function of learning conditions (generate vs. read) and match vs. mismatch of moods at learning and test. Based on data in Eich and Metcalfe (1989).

effects were observable with free recall but not with recognition, which resembles the findings of Kenealy (1997). In addition, the effects on free recall were greater following the generate task than following the read task. Other similar studies provide additional support for the notion that mood-state effects are greater when internal events (rather than external events) are involved at learning and/or test (Macaulay et al., 1993).

EMOTION, ATTENTION, AND PERCEPTION

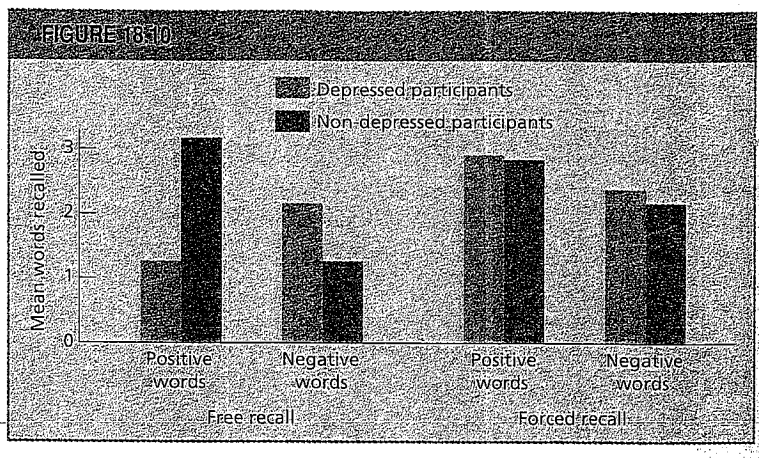
Most research concerned with mood effects on attention and perception has focused on anxiety or depression. One reason is that they can be studied at both normal and clinical levels. However, a problem with trying to compare the effects of anxiety and depression on cognitive functioning is that individuals who are high in anxiety tend to be high in depression, and vice versa. This is true of both normal and clinical populations.

Research in this area has been strongly influenced by Beck's schema theory, which predicts that there should be facilitated processing of schema-congruent information in attention and perception. However, Bower's (1981) network theory is also relevant. It has mainly been applied to memory, but has implications for other aspects of cognitive functioning. According to network theory, whenever the node corresponding to an emotion is activated, activation spreads out to all of the related nodes. If someone is happy, then nodes relating to happy personal experiences and similar concepts to happiness (e.g., euphoria, joy, contentment, and so on) will be activated. This widespread activation should facilitate performance across a wide range of tasks involving processing of happiness-related information.

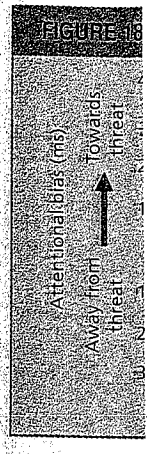
The focus in this section will be on two main cognitive biases. First, there is *attentional bias*, which is selective attention to threat-related rather than neutral stimuli. Second, there is *interpretive bias*, which is the tendency to interpret ambiguous stimuli in a threatening rather than an innocuous fashion.

Before proceeding to discuss the effects of anxiety and depression on attention and perception, it is worth mentioning their effects on memory. The main focus of the research has been on two memory biases:

1. Explicit memory bias, in which negative or threatening information is retrieved relatively better than positive or neutral information on a test based on conscious recollection.
2. Implicit memory bias, in which memory performance for negative information is relatively better than that for neutral information on a test in which conscious recollection is not involved.



Free and forced recall for positive and negative words in individuals high and low in depression. Based on data in Murray et al. (1999).



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Williams et al. (1997, pp. 285–288) reviewed the relevant studies, and came to the following conclusions:

> Out of nine studies using indirect [implicit] tests of memory in anxious subjects or patients, seven have found significant bias towards negative material . . . no study has yet found word congruent bias in implicit memory in depression . . . all published studies appear to find explicit memory biases in depression, yet only a third of the studies on trait anxiety or GAD [generalised anxiety disorder] find explicit memory biases.

More recently, it has proved hard to replicate the finding of an implicit memory bias in anxiety. For example, Richards et al. (1999, p. 67) reported three experiments on implicit memory, and came to the following conclusion: "None of the experiments offered any support for the prediction of a threat-related implicit memory bias in high-trait anxiety."

There may also be problems in interpreting the consistent finding of an explicit memory bias in depression (see Burt, Zembar, & Niederehe, 1995, for a review). Murray, Whitehouse, and Alloy (1999) showed that the typical explicit memory bias in depression disappeared in certain conditions. They asked high and low scorers on Beck's Depression Inventory to perform a self-referential task ("Describes you?") on a series of positive and negative words. Then the participants provided free recall or forced recall, in which they were required to write down a large number of words. There was the usual explicit memory bias in depression with free recall, but no bias at all with forced recall (see Figure 18.10).

What do these findings mean? According to Murray et al. (1999, p. 175), they "implicate an important contribution of diminished motivation and/or conservative report criterion in the manifestation of depression-related biases and deficits in recall."

Anxiety

The effects of anxiety on attention and perception have been studied in normal and clinical populations. Among normal individuals, those high and low in anxiety have been identified on questionnaires measuring trait anxiety (e.g., the Spielberger State–Trait Anxiety Inventory). Clinical studies have used patients suffering from various anxiety disorders, including generalised anxiety disorder, social phobia, panic disorder, and obsessive-compulsive disorder. In general terms, similar findings have been obtained from normal and clinical populations.

Attentional bias

The existence of *attentional bias* in anxious individuals has been shown in several studies (see

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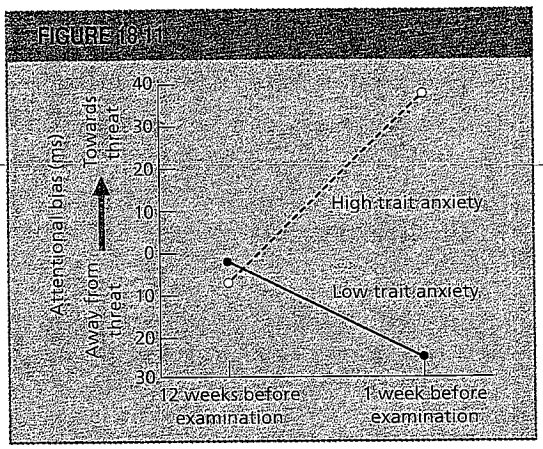


Attentional bias for examination-relevant stress words as a function of trait anxiety and proximity of an important examination. Based on data in MacLeod and Mathews (1988).

Eysenck, 1997), many of which used the dot-probe task. In this task, two words are presented at the same time, one to an upper and the other to a lower location on a computer screen. On critical trials, one of these words is threat-related and the other is neutral. The allocation of attention is measured by recording speed of detection of a dot which can replace either word. It is assumed that detection latencies are shorter in attended areas.

MacLeod and Mathews (1988) used the dot-probe task. Attentional bias was affected by state anxiety as well as by trait anxiety, in line with the expectations of the moderator approach discussed earlier. High and low trait-anxious students showed no attentional bias towards or away from examination-relevant stress words a long time prior to an important examination (see Figure 18.11). In the week before the examination, when state anxiety levels were elevated, the high trait-anxious students showed attentional bias to the threat-related stimuli, whereas those low in trait anxiety showed bias away from the same stimuli.

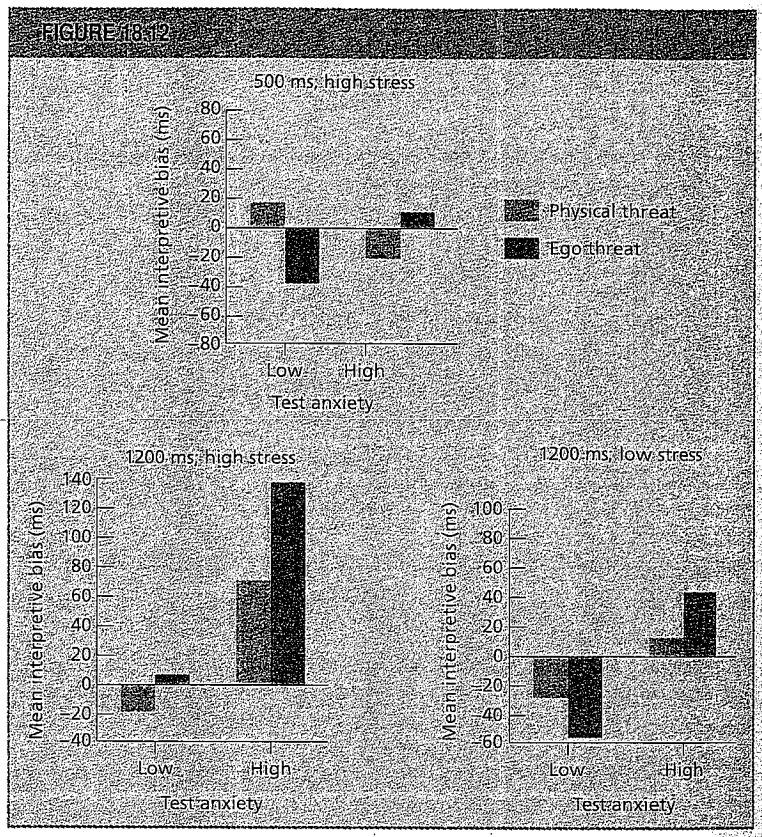
Attentional bias has also been studied by the emotional Stroop task. The participants have to name the colours in which words are printed as rapidly as possible. Some of the words are emotional (e.g., stupid; inadequate) whereas others are neutral. The key prediction is that participants will take longer to name the colours of emotion-congruent words, because such words will be attended to more than will neutral words. Most of the studies using normals high in trait anxiety or clinically anxious patients have supported the prediction. In some studies (e.g., Mogg, Kentish, & Bradley, 1993), the threat-related words were presented subliminally (below the conscious threshold). The emotional Stroop effect was still found, suggesting that attentional bias may involve more or less automatic processes operating below the level of conscious awareness.

There has been some dispute about the appropriate interpretation of findings with the emotional Stroop. As De Ruiter and Brosschot (1994, p. 317), "The increased Stroop interference might . . . be the result of an attempt to avoid processing the stimulus because it contains emotionally valenced [loaded] information . . . Attentional bias occurs in the early stages, and cognitive avoidance at later stages."

Interpretive bias

There is convincing evidence that anxious individuals possess an *interpretive bias*. For example, Eysenck et al. (1987) asked participants to write down the spellings of auditorily presented words. Some of the words were homophones having both a threat-related and a neutral interpretation (e.g., die, dye; pain, pane). They reported a correlation of +0.60 between trait anxiety and the number of threatening homophone interpretations.

A potential problem with the homophone task is that the participants may think of both spellings. In that case, their decision as to which word to write down may involve response bias (e.g., which spelling is more socially desirable?). Eysenck et al. (1991) assessed response bias using ambiguous sentences (e.g., "The doctor examined little Emily's growth"). Patients with generalised anxiety disorder were more likely than normal controls to interpret such sentences in a threatening way, and there were no group differences in response bias.



Interpretive bias in high-anxious and low-anxious participants as a function of stress condition (high or low) and context–target delay. Adapted from Calvo and Castillo (1997).

More detailed information about interpretive bias was reported by Calvo and Castillo (1997). They presented ambiguous sentences concerned with ego threat, physical threat, or neutral events under low or high stress conditions. Each sentence was followed by a disambiguating sentence containing a target word confirming or disconfirming the consequence implied by the ambiguous sentence. The target word was presented either 500 (short delay) or 1200 milliseconds (long delay) after the preceding context, and the task was to name the target word as rapidly as possible.

Interpretive bias was shown when the target word was named faster when it confirmed a threatening interpretation than when it disconfirmed such an interpretation. The high-anxious participants showed strong interpretive bias at the long delay under high stress conditions, but not at the short delay or with low stress (see Figure 18.12). What do these findings mean? Interpretive bias depends on state anxiety or anxiety as a mood state as well as on anxiety as a personality dimension. In addition, interpretive bias does not occur rapidly and automatically, but rather involves subsequent strategic processes.

Depression

The effects of depression on emotion-congruent processing have been studied in various attentional and perceptual tasks. Normal and clinical depression have been considered. Depression in normals has often been assessed by questionnaires such as the Beck Depression Inventory.

Attentional bias

There is little convincing evidence for the existence of attentional bias among depressed individuals. In a study using the dot-probe task, MacLeod

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et al. (1986) found that anxious patients showed an attentional bias when a threatening and a neutral word were presented together. However, depressed patients showed no attentional bias.

Gotlib, McLachlan, and Katz (1988) used a modified version of the task employed by MacLeod et al. (1986), but presented emotionally positive words as well as emotionally negative and neutral words. There was an effect of depression on attention, in that the non-depressed participants attended selectively to positive stimuli. However, Gotlib et al. (1988) did not establish whether the attentional bias was due to anxiety rather than to depression. Mogg et al. (1991) carried out a replication of the Gotlib et al. (1988) study, and found that the attentional bias was due to state anxiety rather than to depression.

Most studies on attentional bias in depression have probably measured fairly automatic attentional processes. An exception is a study by Matthews and Antes (1992) on controlled attentional processes. They measured the eye movements of depressed and non-depressed individuals who were presented with slides containing "sad" and "happy" regions. The depressed participants focused relatively more on the sad regions and less on the happy regions.

Interpretive bias

The effects of depression on interpretation of ambiguity have been assessed in several studies. The evidence consistently indicates that there is an interpretive bias in depressed individuals. Various studies (discussed by Rusting, 1998) have made use of the Cognitive Bias Questionnaire. Events are described briefly, with participants having to select one out of four possible interpretations of each event. Depressed patients consistently select more negative interpretations than controls.

Pyszczynski, Holt, and Greenberg (1987) carried out a study in which depressed and non-depressed students rated various possible future events. The depressed participants rated negative future events as more likely to happen than did the non-depressed participants, whereas the opposite was the case for positive future events.

CONCLUSIONS ON EMOTIONAL PROCESSING

General evaluation

Rusting (1998) reviewed the relevant research literature more thoroughly than has been possible here. As a result, we will start with one of her main conclusions (1998, pp. 189–190):

> Most of the traditional emotion-congruency literature has examined the effects of moods and traits on the processing of emotional stimuli separately. However, this literature has yielded mixed findings across perception, attention, interpretation/judgement, recall and recognition, and autobiographical memory tasks. Although many studies do obtain evidence for mood-congruency and trait-congruency, some studies have found mood-incongruency effects, and others have found no effects of mood or personality at all.

There are several possible reasons why the findings have been somewhat inconsistent. First, participants who are in a negative mood state may use various strategies (e.g., thinking about positive events) to improve their mood. If these strategies succeed, they will weaken any findings. Second, some studies of mood congruity may have produced non-significant findings because of discrepancies between the emotional state of the participants and the specific emotional content of the learning material. For example, participants in a depressed mood may be asked to learn anxiety-related words. Relevant evidence was reported by Ingram et al. (1987). Depressed but non-anxious participants had enhanced recall of depression-relevant words, whereas anxious but non-depressed participants had greater recall of anxiety-relevant words. Third, there have generally been more significant findings when the participants had to process the learning material with reference to themselves. Why is this? According to Rusting (1998, p. 183), "studies that incorporate self-referent processing tasks may actually be tapping

into stable structures in memory, rather than producing effects that are purely dependent on temporary mood states."

There is only limited support for the traditional approach, in which it was assumed that personality and mood have independent effects on emotional processing. What about the mediator and moderator approaches? There have been practically no attempts to assess the mediator approach. The evidence is most consistent with the moderator approach. According to Rusting (1998, p. 188), the evidence for this approach, "is fairly consistent across attention, interpretation/judgement, recall and recognition, and autobiographical memory tasks. In each of these areas there is some evidence indicating that certain personality traits moderate whether mood-congruency or mood-incongruency effects are obtained."

It makes sense that emotional processing should depend interactively on traits and mood states. Any given personality trait is associated with a richly interconnected network of relevant emotional information and knowledge. However, there is a huge amount of information in long-term memory, and so this trait-relevant information is only likely to influence emotional processing when it is activated by the appropriate mood state. Thus, maximal effects on emotional processing will be obtained when individuals possess the relevant knowledge structures (personality traits), and when these knowledge structures are fully activated (mood states).

Theories of emotional processing

The research findings provide more support for the theoretical approach of Williams et al. (1988, 1997) than for Bower's network theory or Beck's schema theory. For example, there is strong evidence that anxiety is associated with an attentional bias, but the evidence is much weaker so far as depression is concerned. According to network and schema theories, individuals in a depressed mood should have facilitated processing of (and attention to) mood-congruent stimuli, and should thus show attentional bias. In contrast, Williams et al. (1997) argued that depressed individuals do not engage in excessive perceptual processing of threat-related stimuli, and so they should not have an attentional bias.

The theory of Williams et al. is also better equipped to handle the findings on explicit and implicit memory biases. Network and schema theories predict that anxious and depressed individuals should show both kinds of memory bias. However, it follows from the Williams et al. theory that anxiety should tend to produce an implicit memory but not an explicit memory bias, whereas the opposite should be the case with depression. There is some support for these predictions, but anxiety is often associated with an explicit memory bias.

Network and schema theories also have difficulties with the findings from studies on perceptual word recognition of emotional and neutral words. In most of these studies, words were presented very briefly but for progressively longer until they were identified correctly. As Niedenthal, Setterlund, and Jones (1994, p. 93) concluded, "Research designed to explore emotional influences in perception has revealed little systematic evidence for changes in the efficiency of word recognition as a function of emotional state." For example, Gerrig and Bower (1982) put hypnotised participants into a happy or angry mood, and then presented positive, negative, and neutral words. There was no evidence of any emotion-congruent effects in two experiments, although this is what is predicted by network theory.

Why have most studies failed to obtain evidence for facilitated processing of emotion-congruent information in perceptual word recognition? *Selective* attention was not involved, in that the participants were presented with only one stimulus at a time. If mood states influence selective attentional processes, as is proposed by Williams et al. (1988, 1997), this would explain why there is evidence for attentional bias but not for emotion-congruent effects in word recognition.

What of the future? Theoretically, there is a need to develop the approach of Williams et al. They have made good use of the distinction between perceptual and conceptual processes to shed light on differences between anxious and depressed individuals in the processing of threat. However, most tasks involve a mixture of perceptual and

conceptual processes, and it is often hard to identify their respective contributions. Human information processing is very complicated, and so much more complex theories will be required, which may attach less importance to the imprecise distinction between perceptual and conceptual processes.

Experimentally, there has been too much emphasis on the processing of threat-related environmental stimuli (e.g., words). Anxious individuals often exhibit cognitive biases for *internal* stimuli. For example, patients with panic disorder catastrophically misinterpret their own physiological activity (Clark, 1986), and patients with social phobia have an interpretive bias for the adequacy of their own social behaviour (Stopa & Clark, 1993), assuming it to be much less adequate than is actually the case.

Finally, it is important to emphasise the potential relevance of research on emotional processing for an understanding of the anxiety disorders and clinical depression. For example, attentional, interpretive, and memory biases can all produce increased levels of anxiety or depression in individuals who are already anxious or depressed. Eysenck (1997, p. 100) discussed some of the implications so far as anxiety is concerned:

> Cognitive biases applied to the processing of threat-related information increase the level of state anxiety, and elevated state anxiety exaggerates the cognitive biases. This can create a positive feedback loop which eventually creates extremely high levels of uncontrollable experienced anxiety. Anxious patients often have more pronounced cognitive biases than normals high in trait anxiety, and so may be especially likely to become trapped in such positive feedback loops.

CHAPTER SUMMARY

- Does affect require cognition? Affective responses can occur without any conscious awareness of cognitive processing. However, pre-conscious cognitive processing generally precedes any affective reaction when there is no conscious awareness of cognitive processing. LeDoux has shown the existence of a fast, non-conscious emotion circuit and a slow, cortical emotion circuit. Power and Dalgleish have put forward a multi-level theory in which emotion can be produced either automatically or via conscious processes.
- Theories of emotional processing. Bower's network theory applies to mood and emotional processing, and Beck's schema theory applies to personality and emotional processing. Network theory predicts mood-state dependent recall, mood congruity, thought congruity, and mood intensity. Mood states can be induced by means of the Velten procedure. According to Beck's schema theory, schemas or knowledge structures (when activated) produce processing biases, in which the processing of schema-consistent or emotionally congruent information is favoured. The two theories can be combined in the moderator or mediator approaches. Williams et al. have proposed a theory, according to which anxiety enhances perceptual processing of threat-related stimuli and depression increases conceptual processing of such stimuli.
- Emotion and memory. There is experimental support for mood congruity and mood-state-dependent recall. Bower has proposed a causal belongingness theory, according to which memory is best when the learner perceives that his or her mood state has been caused by the learning material. Eich and Metcalfe argued that mood has stronger effects on memory for internal events than for external events.
- Attention and perception. Anxious individuals have attentional and interpretive biases, and these biases are greater in stressful conditions. Interpretive bias depends on strategic rather than automatic processes, whereas the opposite is the case with attentional bias. Depressed individuals mostly show an interpretive bias, but no attentional bias. Anxiety has the function of detecting

potential dangers, and this leads to enhanced perceptual processing of threatening stimuli. Depression is involved in replacing failed goals, and this leads to increased conceptual processing of threat-related information.

- Conclusions on emotional processing. There is reasonable support for the moderator approach, which claims that emotional processing depends interactively on personality and mood state. Network and schema theories mistakenly assume the following: (1) there will be facilitated processing of emotion-congruent information in virtually all situations; and (2) different emotional states have the same effects on cognitive processing. The theory of Williams et al. accounts for the differences in cognitive biases between anxious and depressed individuals better than network or schema theory.

FURTHER READING

- Eysenck, M.W. (1997). *Anxiety and cognition: A unified theory*. Hove, UK: Psychology Press. This book presents a new cognitive theory designed to integrate research on anxiety as an emotion, anxiety as a personality dimension, and the major anxiety disorders.
- Power, M., & Dalgleish, T. (1997). *Cognition and emotion: From order to disorder*. Hove, UK: Psychology Press. This excellent book contains comprehensive coverage of theories and research linking cognition and emotion.
- Rusting, C.L. (1998). Personality, mood, and cognitive processing of emotional information: Three conceptual frameworks. *Psychological Bulletin, 124*, 165–196. This article provides a competent and detailed account of research on emotion and cognition.
- Williams, J.M.G., Watts, F.N., MacLeod, C., & Mathews, A. (1997). *Cognitive psychology and emotional disorders (2nd Edn)*. Chichester, UK: Wiley. Research on cognitive biases in patients suffering from anxiety and mood disorders is discussed in detail in this informative book.