

Cognitive Therapy and Research

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Toward an Information-Processing Analysis of Depression¹

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This paper presents an analysis of depression based upon several standard information-processing concepts. According to this analysis, the initial experience of depression can be conceptualized as resulting from the activation of an affective structure referred to as a depression-emotion node. Once this unit is activated, depressive cognitions are proposed to recycle through the individual's cognitive networks, serving to maintain depressive affect. It is suggested that this depressive recycling process holds several cognitive and behavioral implications for the depressed individual. Potential mediating and exacerbating factors for this process are discussed, and the relationship of the present analysis to current theory and research in depression is considered.

In recent years psychology has witnessed an upsurge of theoretical interest in the etiology and maintenance of depression. Although there are currently a number of theoretical ideas concerning depression, to date the most influential theories of depression have been proposed by Beck (1967; Beck, Rush, Shaw, & Emery, 1979), Lewinsohn (1974; Lewinsohn, Youngren, & Grossecup, 1979), Rehm (1977), and Seligman and his associates (Seligman 1974; Abramson, Seligman, & Teasdale, 1978). According to Beck (1967; Beck et al., 1979), for example, depression is caused by particular stresses that evoke the activation of a schema that screens and codes the depressed individual's experience in a negative fashion. This distorted structuring of perceptual experience leads to what Beck terms the "cognitive triad" and causes depressed individuals to perceive themselves, their

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future, and their environment in a nonveridically negative manner. Lewinsohn (1974), on the other hand, has advanced a behavioral theory of depression proposing that depression is due to a decrease or lack of response-contingent positive reinforcement in the individual's environment, along with the individual's inability to replace this reinforcement. Thus, according to Lewinsohn, depression is the result of environmental factors along with deficits in depressed individuals' ability to alter these factors. While incorporating some of the elements of Beck's and Lewinsohn's theories, Rehm (1977), however, has suggested that the major factor in depression is self-control. According to this view, depression results from deficits in several self-control areas. These deficits are "(1) selective monitoring of negative events; (2) selective monitoring of immediate as opposed to delayed consequences of behavior; (3) stringent self-evaluative criteria; (4) inaccurate attributions of responsibility; (5) insufficient self-reward; and (6) excessive self-punishment" (Rehm, 1977, p. 795). Finally, Seligman (1974) originally advanced a learned helplessness model of depression in which depression was seen as the result of perceived noncontingency between the individual's responses and outcomes. More recently, Seligman's theory has been reformulated to include the causal attributions of depressed individuals as important etiological and maintenance factors in depression (Abramson et al., 1978). Hence, in this reformulated model, at least some cases of depression are proposed to result from the perception of response-outcome noncontingency plus the attributions individuals make as to the causes of these outcomes. In this regard, Abramson et al. (1978) argue that depressed individuals typically make internal, global, and stable attributions for failure and external, specific, and unstable attributions for success.

Each of these currently popular theories has thus attempted to provide a reasonably complete and comprehensive account of the psychological aspects of depression. In addition, each theory has also engendered a relatively impressive amount of empirical support (Blaney, 1977). Since each theory postulates a somewhat different etiology and maintenance for depression, however, this empirical support has led to a somewhat confusing state of theoretical affairs: Because the different postulates of the various theories have all received empirical support, it is difficult to assess which theory most adequately conceptualizes the essential processes and mechanisms of depression. The reason that all of these theories have received support, of course, is that each focuses upon a different set of characteristics and behaviors associated with depression. The different formulations, for example, have considered perception, attribution, reinforcement, or self-control processes, respectively, to be the primary determinants of depression. Consequently, researchers operating within dif-

ferent theoretical frameworks have posed different conceptual questions, have employed different methodologies, and have obtained different findings. As a result, significant and important contributions have been made within each area, but the translation of empirical findings and theoretical notions across these areas has been problematic. Thus, in terms of the diversity of data available at present, none of the currently influential theories would seem to be able to offer a reasonably comprehensive account of depression.

Considering the prevalence of depression and the current level of theoretical and empirical interest in it, an integrative psychological analysis of depression would seem to be useful to theoreticians, researchers, and clinicians alike. In order to be comprehensive, such an analysis must not only explain the symptoms, characteristics, and behaviors associated with depression but must also account for the theoretical constructs and empirical findings of the current theories of depression. This paper will propose a heuristic framework for depression that attempts to integrate the theory and research of previous depression models as well as explain the predominant characteristics of depression.

Although researchers have been unable to agree upon a basic classification system for depressive disorders, at present the best available evidence suggests a distinction between bipolar and unipolar depression and a separation of depression from formal disorders of thought such as schizophrenia (Andreason, 1982). Therefore, the present analysis will refer to unipolar, nonpsychotic depression that is not characterized by a lack of precipitating events. Although this is only a subset of depressive disorders, it appears to be a rather large subset. In a well-known study on the relationship between life events and clinical depression, for example, Paykel (1974) found that only 15% of a clinically depressed sample evidenced a lack of precipitating events. In addition, Winokur (1970) has argued that unipolar depression is at least five times as common as bipolar depression.

The development of a more comprehensive account of depression may require a different level of analysis than has been employed in previous theories of depression. In this vein, Miller (1975) has argued that previous investigators have largely ignored any theoretical exposition of the cognitive processes and mechanisms that are potentially responsible for the characteristic deficits of depression. To date, the cognitive mechanisms that have been offered in depression theories have been largely descriptive. Beck (1967), for instance, has proposed that a relatively enduring schema in the depressed state leads to the distorted screening and coding of information that causes systematic errors in thinking (e.g., overgeneralization, arbitrary influence). Precisely *how* this schema functions to distort experience, however, is not specified. Similarly, the cognitive mechanisms and processes responsible for Rehm's (1977) proposed self-control deficits and Seligman's

(Abramson et al., 1978) attributional errors have not been delineated. Thus, it would seem that a comprehensive analysis of depression must be approached from a level that permits a more detailed exposition and specification of the cognitive mechanisms and processes that underlie the depressed state. The current theoretical framework in psychology that may be able to more closely approach this goal is the information-processing paradigm.

In many ways the increased interest in the past few years in the information-processing approach has paralleled the upsurge of interest in depression. The information-processing paradigm generally refers to a way of conceptualizing individuals as active seekers and users of both internal and external information and views both the overt and covert behavior of individuals as being best understood in reference to the ways they collect, transform, encode, access, and utilize information (Merluzzi, Rudy, & Glass, 1981; Neisser, 1967). It should be noted that information processing is not a theory per se but rather a confluence of constructs and related methodologies that share common assumptions concerning the conceptualization of human cognition. At present, information processing is widely regarded as the dominant paradigm in the field of cognitive psychology (Lachman, Lachman, & Butterfield, 1979; Neisser, 1980). Not only is this approach employed in cognitive psychology, however; it is being increasingly applied in the areas of clinical (Ingram, in press; Merluzzi, Glass, & Genest, 1981) and social psychology (Cantor & Kihlstrom, 1981) as well.

CURRENT INFORMATION-PROCESSING APPROACHES TO DEPRESSION

In line with the increased interest in both information processing and depression, several researchers have recently begun to apply information-processing ideas to the study of cognitive functioning in depression. The first empirical study of information processing in depression was reported by Davis (1979a), who attempted to examine the encoding of self-relevant information in depression by employing a depth of processing task borrowed from cognitive psychology. Although subsequent flaws have been pointed out in Davis's (1979a) analysis (e.g., Derry & Kuiper, 1981; Kihlstrom & Nasby, 1981), this study and the subsequent research by Davis (Davis, 1979b; Davis & Unruh, 1981) has been instrumental in demonstrating the relevance of information-processing methodology for examining cognitive aspects of depression. Similarly, innovative research by Teasdale and his colleagues (Clark & Teasdale, 1982; Teasdale & Fogarty,

1979; Teasdale & Taylor, 1981; Teasdale, Taylor, & Fogarty, 1980) examining the retrieval of positive and negative information in depression has also suggested the utility of the information-processing approach for understanding this disorder.

Perhaps the best articulated of the current information-processing approaches to depression is the work of Kuiper (Kuiper, Derry, & MacDonald, 1981; Kuiper, Olinger, & MacDonald, in press), who has extended Beck's (1967) model to determine the cognitive parameters of the self-schema in depression. Empirically, Kuiper and his colleagues have provided impressive evidence from converging methodologies to support Beck's (1967) contention that schemata influence information processing in depression. On the basis of this empirical evidence, Kuiper et al. (in press) have suggested a theoretical elaboration of Beck's (1967) theory. Specifically, they have proposed that self-schemata in depression consist of negative content and that these schemata facilitate efficient processing of congruent information. They have also suggested that although such schemata are operative during depression, they may not be potent after remission and are thus not implicated in etiology per se. Kuiper et al. (in press) suggest that generalized dysfunctional beliefs instead may create a vulnerability to develop depressive disorders.

The present analysis differs from previous depression information-processing work in several respects. First, it is important to note that numerous information-processing constructs have been developed to describe a variety of both specific and global cognitive processes. Although previous depression information-processing work and the present analysis share some common assumptions concerning the conceptualization of cognitive factors, the present analysis employs a somewhat different set of constructs than previous work. A second difference pertains to the scope of depressive features addressed by the various approaches. Whereas previous work has contributed significantly to the investigation of several cognitive aspects of depression, the present model attempts to account for a broad range of characteristics, symptoms, and empirical findings in the area of depression. Finally, the present analysis also attempts to specify in a more detailed level of analysis *how* various cognitive mechanisms and processes are implicated in depressive functioning (e.g., how cognitive content may influence processing of content-congruent information). In particular, it is proposed that four theoretical cognitive constructs are specifically relevant to the development of an information processing analysis of depression: (1) network theories, (2) affective structures, (3) depth of processing, and cognitive capacity notions. These constructs will be reviewed briefly to provide a background for the subsequent analysis.

INFORMATION-PROCESSING CONSTRUCTS

Network Theories

The first of these theoretical frameworks is sometimes referred to as an associative network theory or as a spreading activation model.³ In the past, such network theories have been proposed and elaborated upon by Collins and Loftus (1975), Anderson (1976), Bower (1981), and Norman (1981). According to the general framework of these theories, memory is composed of cognitive networks of associated concepts and descriptive propositions. Previous information and events that have been encoded into memory are represented by these propositions. That is, each memory, or memory unit, is composed of a cluster of components (concepts and propositions) making up the memory. These clusters are sometimes referred to as memory "nodes" (Bower, 1981).

In order for a memory or a cognition to reach the individual's conscious awareness, cognitive network theory proposes that its corresponding node must be activated above some minimum threshold level (for a description of how activation leads to consciousness, see Bower, 1981; Norman, 1968). Once this activation reaches a sufficient level, the person consciously experiences the memory. Theoretically, there are at least two ways that a memory may be activated sufficiently to reach consciousness. One is through the presentation of an environmental stimulus array that corresponds to an active memory node. An illustration may be helpful. Suppose, for example, that an individual has been wanting to buy a Porsche. Although this person might not be consciously experiencing thoughts about the Porsche, one of them happens to pass by on the street and the person is "reminded" of the desire to own one. Network theories would argue that this happens because the energy from the Porsche stimulus pattern activates the corresponding "Porsche memory node" to a sufficient level to reach conscious awareness and the individual is reminded of, and begins to think about, the Porsche.

³It should be noted that cognitive network constructs are conceptually very similar to the notion of schemata. Cognitive networks are employed in the present analysis rather than schemata for two reasons. First, spreading activation notions, which are central to the present analysis, are generally discussed in reference to cognitive networks. Schema constructs, on the other hand, are rarely accompanied in the clinical and social literature by a discussion of comparable processing assumptions. Second, there is no agreed-upon definition of schemata (Kihlstrom & Nashby, 1981) and the term has been used with a wide variety of meanings (Neisser, 1976). Thus, the present analysis is structured around a discussion of cognitive networks to avoid the conceptual ambiguity concerning the notion of schemata.

A second manner in which memory units or nodes can be activated is through the spread of activation. Network theories assume that memories are connected with each other through associative linkages. Presumably, memories that are conceptually similar, or that have somehow become associated for the individual, are linked through associative pathways. The strength of these pathways is seen as a function of how strongly the memories are associated. Strongly associated memories will have strong and more closely associated linkages, and weakly associated memories will have weak or perhaps no associative pathways. According to network theory, when a memory is activated, activation is presumed to spread along its associative pathways, causing other memory nodes to become more likely to be activated. The memory nodes that stand the greatest likelihood of being activated in this manner are those that are connected through the strongest associative pathways. Phenomenologically, this spreading activation of memories may be analogous to the individual's stream of consciousness. Thus, not only is the person who wants the Porsche reminded of the desire to obtain one, but a flood of associated cognitions may become conscious as well, such as the inability to buy one on the present salary, the need for a raise or promotion, a project under way that may lead to a promotion, and so on.

Affective Structures

Until recently, information-processing models of cognition have paid relatively little attention to the role of affect in cognitive functioning. In 1981, however, Bower introduced an information-processing construct to account for findings in the area of state-dependent memory in particular, and to examine the relationship between affect and cognition in general. Specifically, Bower (1981) proposed that affect could be conceptualized in terms of affective structures called "primitive emotion nodes." According to this framework, each specific emotion such as depression, anger, joy, or fear is represented by a particular node or unit in memory. Connected to each emotion node is a set of features associated with the emotion, such as its phenomenological or subjective experience, its characteristic autonomic response pattern, the verbal labels used to describe the emotion, and cognitions containing descriptions of events that evoke the emotion. When a particular node is activated, the emotion is experienced and activation is channeled through its connections to evoke the emotion's other manifestations. Thus, for example, the act of narrowly avoiding a speeding car is a situation that will be appraised by most individuals in a manner that activates primarily the fear node, which leads to the subjective feelings of fear along with sympathetic nervous system arousal. Although closely associated

nodes may also be secondarily activated (e.g., anger), the primary activation in this case is of the fear node.

Additionally, Bower (1981) suggests that each emotion node is associated with a particular cognitive network consisting of emotion-related memories and cognitions. Although some connections to the emotion node are believed to be innate, such as the connection to nodes that trigger autonomic responses, cognitive linkages are largely learned and are generally established through contiguity during life events. Bower (1981) illustrates this link establishment process in an example of when the sadness felt at the funeral of a friend (depression emotion node activation) becomes associated with a cognitive node representing descriptions of funerals. Thus, through acculturation, learning, and innate programming, emotion nodes are viewed as being linked with particular cognitive networks containing emotion-congruent (associated) content. When an emotion node is activated, activation is presumed to spread through this associated network in the manner previously described.

Depth of Processing

Another information-processing framework that is relevant for the present discussion of depression is the depth (or levels) of processing model (Craik & Craik, 1978; Craik & Jacoby, 1975; Craik & Lockhart, 1972; Craik & Tulving, 1975). While the previously discussed network theory is concerned primarily with the *structure* of memory, depth of processing is a framework that seeks to describe a *process* by which information can be encoded into memory.⁴ Basically, the depth of processing model proposes that information is more likely to be fully perceived and encoded when it is processed "deeper," where depth refers to the degree and extent of cognitive analysis the information receives. That is, the more cognitive analysis that information receives, the more likely it is to be comprehended and understood. In this paper, this cognitive analysis will be referred to as cognitive elaboration: Information that receives analysis is elaborated upon cognitively. According to depth of processing notions, information can and will receive varying

⁴The theoretical structure of the depth of processing model has been cogently criticized by several writers (e.g., Baddeley, 1978). There are several reasons why depth of processing concepts are employed in the present analysis. For one, on an empirical level the depth processing paradigm has generated an impressive amount of research that has helped to explicate a number of cognitive processes associated with depression (e.g., Davis, 1979a; Derry & Kuiper, 1981; Ingram, Smith, & Brehm, 1983; Kuiper & Derry, 1982). Thus, inclusion of depth of processing concepts in the present analysis provides a conceptual link to current areas of empirical research in depression. Additionally, it is important to recognize that the depth of processing model as originally proposed by Craik and Lockhart (1972) was viewed as a *framework* for memory theory and research rather than as a *model* of memory. It is employed *primarily* in the present analysis as a *framework* for conceptualizing the processes involved in encoding information.

degrees of elaboration. Hence, information that receives extensive cognitive elaboration will be fully analyzed and its possible attributes, implications, and associations will be more fully processed and understood. Information that receives less than extensive elaboration will not be processed as fully and will be understood less. Hence, when a Porsche passes on the road, it is more likely to draw the individual's attention and receive elaboration (be analyzed and thought about) than will other cars that will pass by unattended to, unelaborated upon, and unnoticed. The likelihood of being fully perceived, processed, and consequently encoded into memory is therefore viewed as a function of the "depth" to which information is processed, or how much cognitive elaboration such information receives.

The notion of depth of processing and cognitive elaboration is quite compatible with the earlier discussed network theory. As originally advanced by Craik and his colleagues, information can be processed to different cognitive depths or "levels." These different levels may be viewed as corresponding roughly to different cognitive networks, with larger and more intricate networks being seen as representing deeper cognitive levels. The events, propositions, and concepts of these networks thus become the mechanisms for cognitive elaboration: Information that accesses and activates larger networks is processed deeper (elaborated upon and more fully assessed) because of the more cognitive associations to which it can be linked. In the words of Mandler (1975), "the more complex the mental structures, the more complex the meaning analysis, the richer the input, and the more implications a particular input will have for a variety of different past experiences (represented in structures)" (p. 27).

Empirical research has generally supported the postulates of the depth of processing model. Information processed on a "structural" level (attending to its physical properties, such as loudness, or whether it is printed in capital or small letters), for example, is remembered less frequently in incidental recall tasks than "deeply" processed semantic information (e.g., attending to the meaning of a stimulus) (Craik & Tulving, 1975). Information that is processed on a self-referent level (determining if the information is descriptive of the self), however, is recalled the most frequently of all (Rogers, Kuiper, & Kirker, 1977). Theoretically, this is because cognitive associations about oneself represent the largest and most intricate network one has, and thus permit more complex and extensive cognitive elaboration, resulting in a better memory trace.

Cognitive Capacity

A final information-processing concept relevant to the present analysis concerns the notion of cognitive processing capacity. Cognitive

capacity is sometimes referred to as the same as attention or consciousness (see Lachman et al., 1979). Individuals have processing limits: They can only process a finite amount of information at any given time, or, stated another way, the amount of attention they can pay is limited. The reason for this is that information processing requires processing capacity and that this capacity is limited. When this capacity is exceeded, no more information can be attended to or processed. Not all information utilizes the same proportion of capacity, however. The information required to drive a car, for example, engages little capacity because of the overlearned and largely automatic nature of this task. Processing information required to solve a complex problem, on the other hand, demands attention and necessitates a considerably larger proportion of capacity.

In regard to the previously discussed information-processing concepts, both "deep" cognitive processing and cognitive elaboration are viewed as requiring adequate cognitive capacity. In order to extensively elaborate and understand information, a relatively larger proportion of capacity is necessary than for minimally elaborated information. The individual who extensively analyzes a set of information must employ a large proportion of processing capacity (i.e., it takes all of their attention). Similarly, processing information to deeper levels, and thus through larger cognitive networks, requires that a correspondingly greater amount of capacity be devoted to the task.

To summarize and integrate these frameworks, then, network theory postulates that memories and their associated components are represented by descriptive propositions that are connected via associative linkages. Once activated beyond a certain threshold, the contents of these memory structures enter the individual's conscious awareness in the form of cognitions. Incorporated into particular cognitive networks are proposed to be emotion nodes that function through activation to excite other components associated with the emotion. According to the depth of processing framework, information is perceived and encoded into memory by being elaborated within the various networks. The more complex the network is, the more elaboration the incoming information is capable of receiving. Additionally, cognitive elaboration is presumed to require a proportion of the individual's limited cognitive capacity. The more extensive the elaboration, the greater the amount of capacity that is employed. These concepts will now be employed to describe how information-processing constructs would account for depression.

ONSET OF DEPRESSION

The etiology of any psychological state is obviously a complex process involving the interaction of a variety of factors. An information-processing

analysis of depression views these factors as converging upon the basic mechanism of the depression emotion node. Thus, in line with Bower (1981), the present analysis proposes that the phenomenological experience of depression along with onset of depressive symptoms results from the activation of an individual's depression node. Although other emotion nodes may be activated concurrently, the remainder of the present analysis will focus upon effects resulting from the primary activation of this specific node.

The present analysis proposes that the activation of the depression node is determined by the *appraisal* of life events. The appraisal construct, as first discussed by Arnold (1960) and later in more detail by Lazarus (1966, 1968, 1982), refers to the manner in which life events are linked to the contents of existing cognitive structures (e.g., attitudes, beliefs). More specifically, appraisal is typically seen as the process that gives subjective meaning to external events and is generally thought to be determined by individuals' (1) beliefs about the parameters of a particular life event, and (2) beliefs as to the effects of the event (Averill, 1979). Thus, for example, if an individual whose significant other has just left him or her for another believes that he or she will never see the other again (a parameter of the event) and that he or she will not be able to function without the other (a perceived effect of the event), then it is proposed that this event will be cognitively appraised in a way that will activate the depression node (see also Billings & Moos, 1982, for discussion of appraisal processes in depression).

Although there may be a variety of life events capable of activating primarily the depression node, research by Brown (1979) and Paykel (1974, 1979) suggests that the broadly conceived notion of loss (e.g., separation from a significant other, serious illness, unpleasant reassessments of relationships; Brown, 1979) is the only class of life events that appears to be systematically and consistently related to the onset of depression. Therefore, losses that are appraised as subjectively meaningful according to the individual's preexisting knowledge or beliefs are viewed as precipitating a high degree of activation in the depression node. Losses with little or no meaning, on the other hand, will precipitate correspondingly little activation. Given such a conceptualization, it is important to note that what may appear to outside observers to be a minor loss may nonetheless lead to depression if it is appraised as meaningful by the individual.

The activation of the depression node is not necessarily limited to a single event. It is proposed that the activation of depression can also be a cumulative process. If, for example, several moderately or mildly important losses are experienced over a brief period of time, their activation values can summate and produce greater depression than any of the losses singularly. Thus, intense depressive affect can be accessed either by a very important single negative event or by several such events occurring together or suc-

cessively over a temporally related period of time. In regard to this latter possibility, Paykel (1979) reports that an accumulation of events prior to the onset of depression is very frequently reported by depressed individuals.

There may be a variety of factors that serve to either shorten or lengthen the duration of depressive episodes (several illustrations of these factors will be provided later). In the absence of these factors, however, level of activation is also viewed as the underlying mechanism that determines depression duration. Once activated, cognitive units are proposed to experience a period of decay until the activation level falls below threshold. This same function is seen as holding true for an activated depression node: Activation will gradually decay until the individual no longer experiences depressive affect. Hence, the higher the initial activation level, the longer it will take to decay to subthreshold levels. The initial activation level is, in turn, determined by the weight or value that the individual places on the negative event (i.e., how it is appraised). The decaying activation process is viewed as largely accounting for the fact that depression has a time-limited course (Beck, 1967; Robbins & Guze, 1969; Weissman & Paykel, 1974; Winokur, 1970) and generally improves with or without treatment (Lewinsohn & Hoberman, 1982).

MAINTENANCE OF DEPRESSION

Although the activation of a depression node is viewed as the necessary and sufficient causal event for accessing depressive affect, the present analysis proposes that this affect is maintained by a somewhat different, yet related, set of cognitive processes and mechanisms. Generally, the maintenance of depression is postulated to result from the cognitive activity engendered by the depression node.

Since the depression node is seen as the central part of particular cognitive networks, it will be connected with associative linkages to various other units in the network. Because of the associative nature of cognitive networks, it is proposed that these other units will be the representations of events that in the past accessed depression. Additionally, cognitions that were related to past feelings of depression would also be linked in this network (e.g., the child who is told that he or she is no good while being punished by a parent would, through the association of these two events, likely have cognitions of self-degradation linked with depressive affect). These particular memory units will in turn be linked to other units with which they have become associated through past experiences. During a current episode of depression, however, perhaps the strongest associative links will be with the memory units representing the present depressing situation.

Thus a loss-associated cognitive network is established that revolves around the *central* link of the depression node and includes associated cognitions of recent precipitant events, past memories, cognitions, and beliefs.

In line with the notion of spreading activation, the present analysis proposes that when the depression node is activated above threshold, activation spreads through this loss-associated network, causing its various contents to become more likely to be brought to conscious awareness. Isen and Clark (Clark & Isen, 1982; Isen, Shalaker, Clark, & Karp, 1978) have aptly described such a process as a "cognitive loop" where thoughts, memories, and associations consistent with an individual's mood become more accessible to the individual. As activation spreads through the network, its gradient gradually decreases, so that associations with weaker linkages are less likely to become activated than are associations with stronger linkages. Since, however, the depression node is relatively central in this network, it is suggested that as activation cycles through the network, it is eventually fed back, at a slightly lower level because of the decreasing gradient, to the depression node, causing it to remain activated. Phenomenologically, it may seem to the individual that negative memories keep coming back, again and again, and thus maintaining depressive feelings. Under normal conditions, however, this reactivation process gradually decreases as the activation level of the network starts to decay.

This spreading of activation is also viewed as occupying a proportional amount of the individual's available cognitive capacity. As greater levels spread (caused by greater magnitudes of initial activation), more associations in the network become activated above consciousness. As these associations are activated above threshold and the individual begins to actively think about them, a larger proportion of the limited capacity is engaged. Thus, individuals undergoing a depressive episode will have a high degree of attention focused upon themselves and their cognitions as available capacity becomes increasingly occupied by spreading activation.

To illustrate this maintenance process, suppose an individual has just lost an important job. It is proposed here that this loss will activate the individual's depression node, which in turn sends activation spreading through its associated network. Hence, in addition to the initial depression that the individual feels, he or she will "think" about losing the job (memories of the loss precipitants are activated) and will be more likely to think about past depression experiences (as these depression-associated memory nodes become activated). As other associations become activated, cognitions that in the past had been linked to depression (e.g., guilt, self-degradation) may be experienced. Thus, as the individual "thinks depressing thoughts," the depression is maintained as activation is recycled back to the depression node.

The present theory therefore proposes that the central maintenance mechanism for depression is the cycling, or "looping," of depressive cognitions through awareness³ that eventually reactivate the depressive affect structure. From a phenomenological perspective, clinical reports indicate that these cognitions can take two forms: either verbal or visual. Cognitions in verbal form consist of linguistic units, such as words and sentences, which are experienced as depressive self-statements, deductions, inferences, and so forth (e.g., "Why did he leave me?" "If I hadn't made that mistake I wouldn't have lost the job"). Visual cognitions, on the other hand, consist primarily of imaginal information (e.g., the person whose husband has left her imagines him with another woman).

Paivio (1971) has advanced several theoretical propositions that appear to account for these differences in the form of cognitions. According to Paivio, individuals possess two separate representational processing systems: a visual system and a linguistic system.⁶ Visual information, such as imagery, is processed exclusively in the visual system, while verbal information, such as words and sentences, are represented in the linguistic system. Although these systems communicate, they are proposed to operate largely independently of each other. With regard to the present analysis, these two systems are suggested to account for the two different forms of cognitions reported in depression. It is suggested that these two processing systems represent structurally and functionally similar, but separate, cognitive networks that are linked to the same affective nodes. Thus, when activation from the depression node spreads through these networks, the cognitive recycling process can occur in either the verbal or the visual network. When the visual system is active, the individual's depressive cognitions will take the form of images. When the linguistic system is processing, on the other hand, cognitions will be experienced as verbalizations. Furthermore, since these systems are viewed as largely autonomous, the activity in one will have little effect on the activity in the other. Interrupting the processing of one system, therefore, will not necessarily preempt the processing

³Beck (1967) has discussed a similar process in his depression theory that he labels as "ruminations." For Beck, however, these ruminations are only a peripheral aspect of depression. The cycling of depressive cognitions is central to the present analysis of depression.

⁶It should be noted that there is currently a good deal of theoretical debate over the existence of two separate information-processing systems. The present analysis suggests only that the imaginal and verbal systems are largely separate and not that their mode of representation is necessarily different. Paivio's position is described here because it most closely fits this proposal and because it appears to account for some of the clinical reports of depressed patients. For a full account of this controversy, see Anderson (1978).

of the other (Baddeley, Grant, Wight, & Thompson, 1975; Kroll, 1975; Paivio, 1971).⁷

IMPLICATIONS OF THE PRESENT ANALYSIS

The foregoing discussion has presented a general information-processing framework for describing the underlying cognitive processes of depression. In addition to the initiation and maintenance of depressive affect, these processes are viewed as having several implications for the functioning of the individual in the depressed state. These implications can be divided into two broad categories: cognitive implications and behavioral implications.

Cognitive Implications

An important notion in regard to the cognitive implications of the present analysis of depression is that of cognitive elaboration. As previously discussed, it is proposed that in order for information to be fully perceived and its attributes and implications understood, it must be elaborated cognitively (where elaboration refers to the extent and degree of cognitive analysis that the information receives). Information that is elaborated, for instance, may activate memories, associations, and images that allow the individual to fully evaluate it. Information that is not cognitively elaborated, however, will not trigger these associations and will therefore have little cognitive impact. Furthermore, different degrees of elaboration are possible

⁷From a treatment standpoint, it is interesting to note that many currently popular cognitive-behavioral interventions focus mainly upon the verbal processing systems with little explicit theoretical regard for visual cognitions. Meichenbaum's (1977) influential work on stress-inoculation training, for example, emphasizes the alteration of negative self-statements (see also Kendall & Holfon, 1981). The present analysis would suggest that such an intervention approach would be effective for only verbal cognitions, while cognition in the visual representational system would remain largely unaffected. Others have also noted this difference, although not from the same perspective as the present information-processing analysis. Tucker, Sheerer, and Murray (1977), for instance, have suggested that cognitive activity can take either a visual or a verbal form, possibly due to mediation by different cerebral hemispheres. They have further suggested that individuals have a tendency to rely primarily on one or the other form of cognition and that cognitive-behavioral interventions should be devised accordingly. While it is quite possibly true that individuals may rely predominantly on either visual or verbal processing, the present analysis suggests that cognitive recycling can and does occur in both systems and that optimal treatments will be designed to interrupt both of these forms of cognitive activity.

ble. Information that is extensively elaborated will be fully perceived. Moderate elaboration, on the other hand, may provide some perception of the information's attributes but it will not be fully appraised. Information that receives no elaboration is processed very little even though it may reach the individual's sensory receptors.

In order to receive elaboration sufficient to permit understanding, adequate cognitive processing capacity must be available for this task. If sufficient capacity is not available them information cannot be elaborated adequately. According to spreading activation notions of cognitive processes, one determinant of the amount of capacity that an information-processing task is afforded is the similarity of incoming information to the individual's current cognitive contents. This notion suggests that in order to be activated about threshold, and therefore receive elaboration, activation from incoming information must summate with activation already in the cognitive network. Without some activation already in the network, incoming information will usually not contain enough activation (unless it is unusually strong) to exceed threshold. Hence, information that sends activation to already active networks will be more likely to be perceived and processed than will information that accesses currently inactive networks (see Norman, 1968, for a more complete description of how this process may work). Thus, information that is consistent with, or similar to, the contents of the individual's active network will receive cognitive elaboration. With regard to depression, then, the present analysis predicts that information that is directly relevant to the precipitating events of the depression will receive a high degree of elaboration. As incoming information decreases in relevance or similarity, however, it will receive correspondingly less cognitive elaboration. The depressed individual is then most likely to elaborate upon, and fully perceive and understand, information that is similar to his or her depressive cognitions. The elaborated information will be that directly related to the current negative event. Negative self-relevant information, because of its similarity to the associative linkages of the depression node, will also receive a high degree of elaboration. Positive self-relevant information and personally irrelevant information, on the other hand, are the least likely to receive elaboration.

Behavioral Implications

Social learning theorists have argued that an individual's behavior is mediated cognitively (see Bandura, 1977; Mischel, 1973). Hence, the manner in which individuals process information about themselves and their environment is an important determinant of the type, quantity, and quality of the behavior in which they engage. Since the present analysis suggests that depressed individuals can be characterized by a particular type of cognitive

activity, several general behavioral consequences can be postulated to follow from this particular processing "style."

One behavioral consequence is that depressed individuals should engage in relatively less activity and behavior. According to social learning theory, a crucial variable in determining whether behavior will be enacted is the subjective outcome, or reinforcement, value of the results of the behavior. If little or no reinforcement value exists, then the probability that behavior will be initiated is significantly decreased. The present analysis suggests that the cognitive activity in depression precipitates a general decrease in the reinforcement value of behavior. Presumably, in order for behavior to be reinforcing, the information from behavioral events must activate the individual's positive emotion nodes. According to the constructs employed in the present analysis, this should happen when information accesses the cognitive networks associated with positive emotions, is elaborated in these networks, and subsequently activates the associated emotion nodes. As previously discussed, the incoming activation from information must generally summate with extant activation in the network to produce superthreshold activation levels and initiate cognitive elaboration. In the depressed individual, however, the positive networks that reinforcement information should access will have little current activation. Thus, information usually capable of providing reinforcement will receive little elaboration, will engage little cognitive capacity, and will be generally ineffective in activating positive emotion nodes. Even when information contains sufficient activation to evoke positive emotion nodes, however, the resulting activation would most likely be relatively weak and short-lived. In depression, then, behavior will "lose" its reinforcement value because of the decreased elaboration of favorable information. If, as social learning theorists argue, behavior is indeed determined to some extent by its reinforcement value, depressed individuals will show a decreased rate of behavior.

A second behavioral implication pertains to the efficiency and effectiveness with which behaviors are performed. In order to adequately perform any behavior, the relevant task demands of the behavior must be attended to and cognitively elaborated upon. Presumably such attention requires that sufficient cognitive capacity be available for the processing of the task demands. Since the depressed individual's cognitive capacity is self-focused with depressive cognitions, however, processing and elaboration of relevant task dimensions are inhibited and the quality of the individual's behavioral responses suffers accordingly. A particularly relevant example of this deterioration in behavioral responses is that of social skills. It is widely recognized that depressed individuals suffer deficits in social skills (e.g., Lewinsohn & Hoberman, 1982; Youngren & Lewinsohn, 1980). The present analysis suggests that this is due to the inability to efficiently process the information required to interact with others successfully. Such successful interaction requires that the individual be aware of (i.e., process) the concerns and feelings of others in the situation and respond to them appropriately. With the depressed individual's cognitive activity, however, there is likely

to be little awareness of, or sensitivity to, other individuals' concerns. Hence, the depressed individual's verbalizations and behaviors are likely to be egocentric, personal-problem-oriented, and negatively toned—all reflections of their current cognitive activity.

EXACERBATING FACTORS

In line with notions of spreading activation, under normal circumstances once a cognitive network has been activated, the activation level eventually wears off over time, leaving the network, and the emotion node to which it may be connected, "deactivated." Thus, once the depression node becomes sufficiently deactivated, the individual no longer experiences feelings of depression and returns to a "normal" mood state. For many depressed individuals, however, this clearly does not seem to be the case. Indeed, depression is one of the most pervasive and, for some people, chronic affective disorder of our time (see Beck, 1967; Mendels, 1970; Nisbett, Borgida, Crandall, & Reed, 1979). In regard to these individuals who remain chronically depressed, or who suffer abnormally long periods of depression, the present analysis proposes several variables that may mediate the normal deactivation of the depression node and prolong the depression process. Before discussing these variables, however, it should be pointed out that those presented here are viewed as illustrative but not exhaustive. Any factor that serves to prolong the recycling of activation into the depression node should exacerbate the individual's depression.

Cognitive Factors

In regard to cognitive influences, the *kind* of information that depressed individuals process is viewed as having an exacerbating effect on depression. As depressed individuals continue to select, process, elaborate, and encode proportionally more depressive information (because of its consistency with their current cognitive contents), the steady flow of this negative information should continue to channel activation to the depression node. Thus, by virtue of a depressive style of information processing, the depressed individual has access to a relatively larger amount of depressing and negative self-relevant information that serves to maintain and possibly worsen the initial depression.

In addition to this selective processing of depressing information, it seems likely that as more of this information is encoded, a large and intricate network of negative associations is developed, allowing for more extensive depressive cognitive recycling and possibilities for cycling activation to the depression node. Further, such a large depressive network should predis-

pose individuals to future depressive episodes as a wider range of information may potentially trigger depressive associations. That is, as the individual develops a larger depressive network, it seems likely that a greater number of events are more likely to be *appraised* as depressing. Thus, the larger the individual's depressive network, the more likely information will be able to activate the associated depression node.

Behavioral Factors

From a behavioral perspective, the way the depressed individual acts may also serve to compound depression. It was previously mentioned, for example, that one empirically documented aspect of depression is an inability to successfully interact with others. Such a dysfunctional level of social skills may precipitate a decline in social support (Coyne, 1976; Strack & Coyne, 1983). Even though friends and acquaintances may sympathize, they may also decide not to interact with the individual who is depressingly self-centered. Thus, not only has an initial loss occurred for the depressed individual but so too has a loss of friendship and support. Another example of a depression-exacerbating factor might be the individual's job performance. If the depressed individual is unable to perform his or her job due to interfering cognitions, a loss of employment may further compound the depression (see below).

Environmental Factors

Cognitive and behavioral factors are not the only possible precipitants of the "downward depression spiral" (Beck, 1967). Additionally, if the individual's initial loss has resulted in a negative alteration of the environment, then depression can be expected to be exacerbated. Thus, the previously mentioned job loss and the decrease in living standard that follows will serve to further exacerbate the individual's depression. Moreover, as long as the individual remains in this negatively altered environment, depression should be maintained.

MEDIATING FACTORS

It is unlikely that any individual will go through life without experiencing a depression-inducing major loss. Given the aforementioned analysis

and the proposed maintaining and exacerbating factors of depression, it is reasonable to inquire as to why everyone does not become severely or clinically depressed. The present analysis suggests that there are at least two possible factors that mediate the impact of an individual's episodes.

Individual Differences

There may be several individual difference dimensions that either predispose people to depression or help to insulate them from it. Although there is potentially a variety of such variables, to illustrate the potential importance of these factors only one will be discussed here. An individual difference factor that has been argued by some to arise through early interactions with parents (Coopersmith, 1967; Epstein, 1976) and that also has been widely recognized as being implicated in depression is the self-concept (Becker, 1979). In line with the information-processing framework presented here, the self-concept is conceived of as a cognitive network of associations to, and beliefs about, the self. In addition to specific beliefs, such self-networks may also encompass more generalized and higher-order functional or dysfunctional beliefs about the self (see Kuiper et al., in press). Rather than having only one self-concept, however, the present analysis suggests that individuals possess both positive and negative self-cognitive networks that are linked respectively to positive and negative emotion nodes and that are established during previous happy or unhappy experiences. With regard to the mediation of depression, it is proposed that the larger and more elaborate an individual's negative self-network is, the greater the universe of events that can act as triggering agents for the depression node. Additionally, once activated, this larger network allows for more extensive and elaborate processing and provides greater potential to perpetuate the recycling of negative cognitions through awareness. Hence, the individual possessing a well-developed negative self-concept might be susceptible to more frequent, more intense, and longer periods of depression. Conversely, the individual with a minimal negative self-concept and a relatively larger positive self-concept should experience fewer, milder, and briefer depressions.

Control Processes: The Volitional Aspect of Information Processing

Until now, the present analysis has focused primarily upon the automatic component of information processing, that is, spreading activa-

tion that channels energy to and from the individual's depression node.⁹ There is, however, another aspect of human information processing that can be referred to as "control processes." In the computer analogy from which much information-processing theory is drawn, control processes refer to the programs and routines that direct what and how information is to be processed. In the human system, control processes represent the volitional component of information processing, or how the individual decides what and how information is to be processed. The notion that individuals can exert some control over how information is processed has been discussed by several cognitive theorists (e.g., Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977; Tyler, Hertel, McCallum, & Ellis, 1979).

With regard to depression, control processes are important determinants of the efforts the individual exerts to alter the largely automatic recycling of depressive cognitions. Spreading activation theory predicts that this recycling will continue automatically until the activation eventually decays. The individual may, however, choose to interrupt this processing by activating other networks (i.e., choosing to think about other things such as positive thoughts), consciously elaborating upon activities, or behaving to modify the negative environment. The important point is that individuals are capable of interrupting this process. Indeed, the emphasis upon interrupting the recycling of depressive cognitions, or modifying "what individuals say to themselves," is a common theme running through a number of cognitive-behavioral intervention procedures (e.g., cognitive relabeling; Goldfried & Davison, 1976; self-instructional training; Meichenbaum & Genest, 1980; cognitive therapy; Beck et al., 1979). This interruption procedure is more popularly known as *coping*. Thus, how much effort individuals put into interrupting the automatic processing of depressive cognitions through a variety of cognitive and/or behavioral activities is viewed by the present analysis as a major determinant of the severity and duration of depression.

SYMPTOMS OF DEPRESSION

One test of any theoretical analysis is how adequately it accounts for the data relevant to the phenomena it seeks to explain. In the case of depres-

⁹It is important to note that the term *automatic processing* is used here in a slightly different manner than as originally discussed by Schneider and Shiffrin (1977). In their discussion of automatic versus controlled processing, automatic processing is viewed as "the activation of a sequence of elements in long-term memory" (p. 1) that does not necessarily require cognitive capacity or attention. The present analysis refers to automatic processing in the sense that the individual does not volitionally control the processing (i.e., it proceeds automatically) but that once this process is initiated, cognitions recycle through *awareness*, are paid attention to, and thus engage available cognitive processing capacity.

sion, these data consist largely of depression's characteristics and symptoms. This paper will thus present a brief survey of the more outstanding characteristics and symptoms of the depressed state and demonstrate how the previously discussed information-processing constructs can be invoked to account for them.

In regard to these characteristics, a very wide and heterogeneous range of symptoms is generally recognized. Beck (1967) describes the most salient symptoms as generally falling into several broad conceptual categories. These categories are emotional manifestations, cognitive manifestations, motivational manifestations, vegetative and physical manifestations, and delusions. Additionally, Miller (1975) has described a related but somewhat different set of manifestations in his review of psychological deficit in depression. His categories are cognitive deficits, motor deficits, perceptual deficits, and communication deficits. Although there is a variety of ways to describe depressive symptoms, the categories of Beck (1967) and Miller (1975) will be employed as a basis for which the present analysis will illustrate its account of depression symptoms.

Emotional Manifestations

The primary symptom in this category is the depressed individual's dejected mood, referring basically to feelings of sadness and dysphoria. As previously described, the present analysis views the phenomenological experience of these emotions to be due to the activation within the individual's cognitive network system of an emotion node for depression.

Cognitive Manifestations

Among the major symptoms that Beck (1967) describes in this category are low self-evaluations and self-criticism, negative expectations, and indecisiveness. With regard to low self-evaluation and criticism, it is proposed that the individual's subjective evaluation of him- or herself will be a function of the cognitive networks that are currently active. That is, when the individual must make some evaluation about the self, he or she will cognitively examine (i.e., think about or remember) the contents of the networks that are most currently salient and hence accessible. When the depression node has been activated by an appraisal, the most active (and hence salient) network will likely be negatively self-relevant. Thus, the information that is cognitively available to the depressed individual will be negative and, therefore, so will the individual's judgments about the self. The negative expectations of the depressed individual are viewed as being in-

fluenced similarly. Those memories of past events that will most likely be cognitively processed will be negative. Hence, in light of the selective recall of past negative events, anticipated future events will be inferred to be equally negative.

According to Beck (1967), the cognitive component responsible for indecisiveness in depression is that the individual feels any choice that will be made will be wrong. Again, reliance upon the contents of current cognitive activity will convince the depressed individual that since (selectively remembered) past choices have turned out badly, future choices can be expected to do so also. Additionally, the present analysis predicts that the negative aspects of any potential choice will be more fully elaborated upon than the positive, leaving any choice to look predominantly negative or wrong.

Motivational Manifestations

Beck (1967) describes the "loss of positive motivation" as being one of the most striking characteristics of depression. The depressed individual, for example, may not perform even the most simple daily tasks. The present analysis postulates two causes for this. First, the depressed individual does not engage in these behaviors because they have lost all or most reinforcement value. With this incentive diminished, there is little or no reason to enact behavior. Second, since the cognitive capacity of the depressed individual is fully engaged by depressive cognitions, little processing of the information necessary to engage in behavior may take place. That is, the depressed individual is "cognitively preoccupied." The possibility of engaging in a particular behavior, for example, may never cross the mind of an individual actively processing depressive cognitions. Therefore, unless adequate attention is paid to potential activities, they will not be performed.

Vegetative and Physical Manifestations

In this category, Beck (1967) maintains that loss of appetite, and libido and sleep disturbances are the primary characteristics. Loss of appetite and libido can be accounted for in terms of the two factors described under motivational manifestations to explain why depressed individuals exhibit lowered motivational levels (i.e., loss of reinforcement value and inadequate processing of activity-related information). With regard to sleep disturbance, a great many depressed individuals report difficulty in falling asleep and problems with awakening early (Beck, 1967). The present

analysis proposes that actively processing depressive cognitions is incompatible with achieving and maintaining sleep. As the individual continues to recycle depressive cognitions, sleep becomes more difficult. Beck (1967) notes in this vein that some severely depressed patients "claim not to have slept at all during the night: they state they can remember 'thinking' continuously during the night" (p. 35). Hence depressive cognitions are proposed to interfere with the conditions necessary for falling and staying asleep.

Delusions

Beck (1967) cites a number of specific classes of delusions that depressed individuals are prone to exhibit (e.g., delusions of worthlessness, punishment, nihilism). The unifying theme among such delusions appears to be their negative self-relevance for the individual. That is, regardless of their specific content, it would seem that the delusions depressed individuals manifest reflect negatively upon themselves. The present analysis views these delusions as being beliefs and inferences engendered by the individual's active or salient cognitive network. Thus, the inferences that depressed individuals draw about themselves are likely to be negatively biased due to the selectively negative information at their cognitive disposal.

Psychological Deficits

Miller (1975) has also reviewed evidence for categories of depressive characteristics. In the area of cognitive deficits, for example, studies have found disturbances in time perception, slower intellectual speed, and some evidence of memory impairment. Studies examining motor deficits have indicated that a general slowing of responses is sometimes seen in depression. Perceptual deficit findings have shown that depressives have elevated visual recognition, pain, and fatigue thresholds. Finally, in the area of communication deficits, research has generally found that depressed individuals emit a lower number of verbalizations, react positively to others less frequently, elicit fewer positive reactions, and have longer action latencies (i.e., elapsed time between verbalizations and behaviors).

The present analysis proposes that all of these findings are explicable in terms of the predominantly internal or self-focused information processing engendered by recycling depressive cognitions and the large amount of cognitive capacity required by this process. Recognition and interpretation of external stimuli requires that adequate processing capacity be available for the task. If it is not available, slower and less efficient perception is more likely. Similarly, efficient motor behavior, whether it is responding on

a task or emitting verbalizations, requires processing the relevant parameters of the task, determining an appropriate response, and then initiating it. If this processing is interfered with or is allocated inadequate processing capacity, then the speed and quality of the response will be compromised. Thus, because of the high degree of self-focused attention that the recycling of depression-linked cognitions precipitate, any task or behavior that requires the processing, integration, and utilization of non-depression-related information will likely be impaired for the individual in a depressed state.

RELATIONSHIP OF THE PRESENT ANALYSIS TO CURRENT THEORIES OF DEPRESSION

In addition to the aforementioned characteristics of depression, empirical research designed to evaluate current theories of depression has also led to the recognition of several characteristics of the depressed state. Generally, this research has been consistent with the various depression models from which it has been derived. Because the present analysis is proposed to be an integrative psychological account of depression, it is incumbent upon it to account for these various findings. Several of these research findings will therefore be reviewed briefly, and it will be shown how the present analysis explains them. Again, this review will not be exhaustive but rather will illustrate how information-processing constructs may account for such findings.

Beck's Model

Beck (1967) proposes that in depression, individuals form a negative cognitive triad that causes them to view themselves, their environment, and their future negatively. Research has generally supported this view. In a study by Hammen and Krantz (1976), for example, depressed subjects were found to evaluate their personal qualities more negatively than nondepressed subjects. Additionally, following failure feedback, depressed subjects' expectancies for future performance were significantly more negative than were nondepressed subjects' expectancies. Additional research also supportive of Beck's (1967) model has suggested that the evaluation and interpretation of information, as well as future expectations, are all more negative in depressed individuals (Krantz & Hammen, 1979; Loeb, Beck, & Diggory, 1971; Weintraub, Segal, & Beck, 1974). Thus, these findings are consistent

with Beck's (1967) hypothesis that depressed individuals will construe themselves, their environment, and their future in a negative fashion.

The present analysis accounts for these findings in terms of the cognitive networks that are currently active in the depressed individual. In the case of depressed individuals, these networks are likely to have negative self-relevant content. Therefore, when depressed individuals are asked to make an evaluation of themselves or of their future expectations, they will rely on the content of the most accessible cognitive networks. Because the content of the accessible networks will be largely negative, evaluations and interpretations based on this information will also likely be negative.

Kuiper's Extension of Beck's Model

As previously discussed, Kuiper (Kuiper et al., in press) has elaborated upon Beck's (1967) model. Although conceptualized from somewhat different information-processing vantage points and focusing upon a different scope of depressive features and level of analysis, Kuiper's extension of Beck's model and the data on which it is based do not appear to be inconsistent with the present analysis. Derry and Kuiper (1981) have found, for example, that depressed individuals incidentally recall more previously presented negative self-relevant information than do nondepressed individuals. In a related vein, Kuiper and his colleagues have also found that depressed individuals (1) more consistently endorse previously endorsed negative self-relevant information than nondepressed individuals, who show an opposite pattern (MacDonald & Kuiper, 1983), (2) less efficiently process information about other individuals (Kuiper & MacDonald, 1982), and (3) tend to overestimate the occurrence of negative events (Kuiper & MacDonald, 1983). In general agreement with Kuiper's theoretical proposals and research, the present analysis proposes that these findings are the result of the activation of a negative cognitive network and its accessibility to the depressed individual. Thus, when negative-content experimental stimuli are properly constructed (i.e., they do in fact match the individual's actual cognitive contents), they should access the individual's active network, receive extensive elaboration, and eventually be recalled more frequently. Similarly, reliance upon this active network should facilitate the consistent ratings of self-descriptors congruent with the network as well as evoke overestimates of life events (negative in this case) that are congruent. Finally, in regard to the processing of information about other individuals, the present analysis proposes that depressed individuals' cognitive capacity will be occupied with the processing of depression and personally relevant cognitions. This increased self-focused attention should therefore permit lit-

tle elaboration of other relevant information and hence less efficient processing of information about others.

Rehm's Model

Rehm has characterized depressed individuals as showing deficits in several self-control areas: self-monitoring (e.g., selective attention to negative events), self-evaluation (failure to make accurate attributions of causality), and self-reinforcement (low rates of self-reward and high rates of self-punishment). Research designed to test these hypotheses has generally been supportive. A study by Wener and Rehm (1975), for example, found that depressed subjects evidenced a tendency to underestimate the number of times they responded correctly on an intellectual task. Clarifying and extending these results, Nelson and Craighead (1977) presented both depressed and nondepressed subjects with high (70% of trials) or low (30% of trials) rates of reinforcement (earning 5¢ for correct trials) or high or low rates of punishment (losing 5¢ for incorrect trials) on a letter discrimination task. Subjects in each of these conditions were then asked to estimate the amount of reinforcement or punishment they had received. Findings revealed that depressed subjects underestimated the amount of reinforcement they received in both conditions, but were reasonably accurate in their estimate of the amount of punishment they received. Indeed, in the low punishment condition, depressed subjects were significantly more accurate than nondepressed subjects. These results have been replicated by DeMonbreun and Craighead (1977), and conceptually similar studies have also been reported by other researchers. In a study by Roth and Rehm (1980), for instance, depressed subjects were found to significantly underestimate the number of positive gestures they made in viewing a videotape of their interaction with another person. Thus, research has lent support to the basic tenets of Rehm's model.

With regard to the perception of positive and negative experiences, the present analysis proposes that depressed individuals will cognitively elaborate on information that is consistent with their current cognitive contents. In the previously mentioned research, therefore, negative information would be expected to receive more elaborate processing and should thus be remembered in greater detail and recalled more accurately. Similarly, positive self-relevant information should be the least elaborated upon and less accurate recall should result.⁹

⁹The proposal that negative information is more extensively elaborated than positive and thus more accurately processed in depression may also have implications for recent "depressive realism" findings (Alloy & Abramson, 1979, 1982). This research has suggested that depressed individuals may draw more accurate inferences than nondepressed people and may therefore

however, relatively little attention is paid to the cognitive mechanisms that underlie the depressed state. Lewinsohn and Hoberman (1982), for instance, view the cognitions present in depression as "depressive efforts to explain to themselves, and to others, why they feel bad" (p. 399). The present analysis, on the other hand, proposes that these cognitions are the central maintenance factor in depression. Additionally, the present analysis suggests that these cognitions account for several of Lewinsohn's research findings. The finding that pleasant events become less reinforcing in depression (Grosscup & Lewinsohn, 1980), for example, is viewed as the result of the nonelaboration of environmental information that is necessary to obtain reinforcement. Similarly, the finding that depressives engage in a low rate of behavior (MacPhillamy & Lewinsohn, 1974) is accounted for by the decreased reinforcement value of the behavior along with depressives' preoccupation with depression related cognitions.

Seligman's Model

In the reformulated learned helplessness model by Abramson et al. (1978), it is proposed that individuals who have a tendency to make internal, stable, and global attributions as to the causes of negative events are more likely to become depressed. Similarly, Seligman, Abramson, Semmel, and von Baeyer (1979) argue that individuals who attribute external, unstable, and specific causes to positive events are also more likely to experience depression. At this point, however, much of the empirical research addressing the learned helplessness models has been equivocal: Some researchers have interpreted their results as supportive (e.g., Raps, Peterson, Reinhard, Abramson, & Seligman, 1982; Raps, Reinhard, & Seligman, 1980; Seligman et al., 1979), and others have interpreted their findings as contrary to the model (e.g., Alloy & Abramson, 1982; Golin, Sweeney, & Shaeffer, 1981; Greer & Calhoun, 1983; Hammen & deMayo, 1982; Harvey, 1981; Pasahow, 1980). Therefore, rather than discussing the extant research on attributional dimensions in depression, the present analysis will address the types of attributions discussed in the reformulated model.

Consider the process one utilizes when making an attribution. The person must first cognitively examine the evidence at his or her disposal. In making an attribution for a past event, this evidence consists of memories and cognitions. As should be readily apparent by now, the present analysis suggests that cognitions employed in making these attributions will be the

In relation to self-reinforcement, this activity can be seen as being dependent upon two factors: the processing of information relative to what is to be reinforced, and the evaluation of this information. As already seen, the present analysis proposes that negative information will be processed more accurately. Since such information is also likely to be evaluated negatively, a decision to self-reward based upon this (selectively perceived) information would be unlikely. Thus, when the individual is processing predominantly negative information, little self-rewarding behavior is apt to be seen.

Lewinsohn's Model

According to Lewinsohn, the central mechanism of depression is the feeling of dysphoria, which results from a low rate of response-contingent reinforcement. A substantial amount of research by Lewinsohn and his colleagues has been generally consistent with the idea that a lack of pleasant events is related to depression (for reviews of this research see Lewinsohn & Hoberman, 1982; Lewinsohn et al., 1979).

The model presented by Lewinsohn and the present analysis agree on the point that dysphoria is central to depression. There is also general agreement with the notion that this dysphoria is accessed by a loss of reinforcement, although the present analysis views this phenomenon somewhat more broadly. Because Lewinsohn's model is cast as a behavioral theory,

be generally more accurate information-processors. As such, this viewpoint poses a strong conceptual challenge to more traditional models, which suggest that depressed individuals cognitively distort information (Roth & Ingram, in press). Instead, according to this view, nondepressed people are the ones who may engage in distortion of information in an unrealistically positive way. Although not directly developed to explain these findings, the present analysis accounts for depressive realism research in terms of the personal favorability of the information processed. Specifically, the present analysis proposes that depressed individuals will indeed be more accurate in the inferences they draw when the appropriate accurate inferences to be drawn require the processing of negative personal information (e.g., a lack of control on a skill task). When the appropriate inferences are based upon positive personal information, however, the present analysis proposes that depressed individuals will be inaccurate. On the other hand, nondepressed individuals who would rely on more positive networks) should show the opposite pattern of accuracy and inaccuracy. This differential accuracy of processing positive and negative personal information would seem to account not only for findings that show depressed subjects making more accurate inferences but also for the previously discussed research showing that depressed individuals underestimate (distort) favorable information (e.g., DeMonbreun & Craighead, 1977; Nelson & Craighead, 1977; Roth & Rehm, 1980).

ones most readily accessible, which are determined by the currently active network. This conceptualization is similar to the availability heuristic described by Tversky and Kahneman (1982). In accounting for judgments under conditions when individuals cannot be certain, Tversky and Kahneman (1982) suggest that rather than relying upon objective evidence, individuals will base their judgments upon the "ease" with which past related instances and associations come to mind. Such availability, they argue, is at least partially determined by the "associative distance" between the cognitive representations of various memories and concepts. Thus, in applying a similar process to attributions, whatever attributions individuals make can be seen as a function of the contents of the currently active (or available) cognitive structure. Since in depression negative networks have been activated, the information that the individual has most available will consist of past negative events and will be generally negatively self-relevant. Attributions made on the basis of this negative information should thus be those that reflect fairly negatively on the individual, such as an internal attribution (e.g., self-blame) for a negative event. Additionally, attributions for negative events should also evidence a tendency to be more stable and global as the individual is more likely to recall negative events more consistently (stable) and across a variety of situations (global). For positive events, however, the diminished recall of past similar events should facilitate more external, unstable, and specific attributions.

CONCLUSIONS

This paper has presented an analysis of depression that employs several standard information-processing constructs to account for the symptoms of depression as well as to integrate previous psychological theory and research in the area. Although it is proposed that this analysis accounts reasonably well for the documented characteristics of depression, it must be pointed out that this analysis was developed specifically to account for the research findings in the area. Therefore, the adequacy of this analysis will have to be evaluated independent of the research upon which it was based. Perhaps the ultimate utility of this or any other theoretical analysis, however, is to raise previously unconsidered questions in the area it seeks to describe. One hopes that this analysis will not only raise questions concerning cognitive processes in depression but will also engender research that provides initial steps toward answering them.

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