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## 6

### MEMORY FOR EMOTIONAL AND NONEMOTIONAL EVENTS IN DEPRESSION

*A Question of Habit?*

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PAULA HERTEL

The truest claim that cognitive science can make might also be the least sophisticated: the mind tends to do what it has done before. In previous centuries philosophers and psychologists invented constructs such as associations, habit strength, and connectivity to formalize the truism, but others have known about it, too. In small towns in the Ozarks, for example, grandmothers have been overheard doling out warnings such as, “Don’t think those ugly thoughts; your mind will freeze that way.” Depressed persons, like most of us, usually don’t heed this advice. The thoughts frozen in their minds might not be “ugly,” but they often reflect disappointments, losses, failures, other unhappy events, and a generally negative interpretive stance toward ongoing experience. By considering these habits of thinking, we should better understand the nature of memory in depressed states. Deliberate attempts to remember are either impaired or facilitated in ways that appear related to habits of thinking. Even more commonly, memory is expressed indirectly through the content of current thoughts and interpretations.

This chapter examines the relations among habitual thoughts—often called ruminations—and memory phenomena in depression. I use “depression” imprecisely, to refer to both diagnostic categories and the self-reported state of dysphoria. “Dysphoria” is used to denote undiagnosed negative affect, of the sort that produces moderate-to-high scores on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Although the patterns of performance associated with self-reported measures of depressed mood—such as BDI scores—are often similar to those obtained from diagnosed samples, occasional evidence for differences should be noted (see Burt, Zembar, & Niederehe, 1995). We should note the imprecision associated with diagnosis as well (e.g., the boundary problems for mood disorders and generalized anxiety disorders; see

Brown, Di Nardo, Lehman, & Campbell, 2001). On the side of simplicity, however, many phenomena appear similar in form, if not extent, across studies measuring dysphoria and depression. (For a short review, see Wenzlaff, Meier, & Salas, 2002.)

Further caution about the use of "depression" is appropriate when considering the many studies performed with experimental mood inductions (e.g., through the use of sad or happy music) in an effort to make causal statements about mood and memory. In some of these studies, the language of depression is used to describe the findings from negatively valenced inductions. (See Parrott & Hertel, 2000, for a description of these and other methodological issues.) Mood-induction studies sometimes reveal patterns similar to those in studies based on self-reports or diagnoses. But because habits of ruminating do not likely characterize students randomly assigned to listen to sad music, this chapter rarely addresses findings from mood inductions.

## Habits of Thought

Negative thinking has been such a prevalent feature of depression, as observed clinically, that Beck (1967) used "schema" to capture its habitual and interrelated qualities. These stable cognitive structures were proposed as one way of organizing and describing thought patterns in depression. "Rumination" is used as a process-oriented companion to the structural construct of a schema. Depressed people tend to ruminate. They ponder the episodes associated with sad feelings and imagine similar future occurrences. They focus on their feelings and wonder if they will ever change (see Ingram, 1990; Nolen-Hoeksema, 1991).

Rumination can be an intensely attention-demanding process, yet the initiation of a ruminative episode is often thoughtless or automatic, even to the extent that the person can become so engaged without awareness. The draw toward rumination has a lot in common with the tendency to attend to *external* stimuli that are emotionally congruent with depressive concepts. For example, dysphoric students are slower to name the color of ink when it spells a word related to depression (e.g., Gotlib & McCann, 1984). On similar tasks nondepressed participants preferentially attend to positive members of word pairs and avoid the negative members, but clinically depressed and dysphoric participants lack this positive bias (McCabe & Gotlib, 1995; McCabe & Toman, 2000).

Mood-related experience also encourages the tendency to find negative meaning in ambiguous information, relatively automatically. Lawson, MacLeod, and Hammond (2002) devised a clever indirect measure of such interpretive biases by measuring the blink reflex to noise occurring as participants imaged situations evoked by auditorially presented ambiguous and nonambiguous words. Participants who had scored high on the BDI produced particularly amplified blink reflexes during the imaging of ambiguous words that lend themselves to

negative interpretations, in a pattern similar to that for clearly negative words. Using a quite different paradigm, Wenzlaff and Bates (1998) presented strings of words that could be unscrambled to form either negative or non-negative sentences. Dysphoric students formed negative versions more often than others did. Even students who were formerly dysphoric displayed this bias under dual-task conditions. Although direct reports of beliefs and thoughts tend toward less negativity as depression lessens (Haaga, Dyck, & Ernst, 1991), findings such as those by Wenzlaff and Bates (1998) reveal the enduring nature of depressive habits of thought (also see Wenzlaff, Rude, Taylor, Stultz, & Sweatt, 2001).

Depressive habits of thought seem, moreover, to exacerbate sad moods and predict future depressive episodes. In an extensive program of research by Nolen-Hoeksema and her colleagues (e.g., Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Nolen-Hoeksema & Morrow, 1993), depressed and nondepressed participants have been asked to concentrate on either self-focused or distracting phrases. The self-focused phrases themselves do not suggest sad or depressed mood; in fact, the nondepressed participants typically report feeling no sadder after concentrating on them than they feel after entertaining thoughts about distracting phrases (e.g., geographical locations). But in study after study, the sad moods of depressed participants have increased following the self-focused statements and decreased following the distracting phrases. Similarly, Fennell, Teasdale, Jones, and Damle (1987) reported improvements in mood after depressed participants focused on distracting images of outdoor scenes. Therefore, habits of thought can affect mood, and recent discoveries have shown that they can also predict future mood impairment (e.g., Alloy, Abramson, & Francis, 1999; Nolen-Hoeksema, 2000; Rude, Wenzlaff, Gibbs, Vane, & Whitney, 2002). Measures of negative-thinking styles, demonstrated either through self-reports or by performance on laboratory tasks, predicted episodes of dysphoria and depression in weeks to come. So, just as depressed mood might establish habits of negative thinking, such habits at least portend, and perhaps help establish, not only temporary changes in mood but also future depressive episodes. Indeed, substantial empirical evidence now supports the concept of a vicious cycle of rumination and mood, described years ago by John Teasdale (1983).

## Habits of Memory

Separating habits of memory from habits of thinking is a somewhat arbitrary exercise. Obviously, ruminative episodes often include autobiographical memories that come to mind habitually. Less obviously, perhaps, even the acts of interpreting current experience in habitually negative ways are themselves instances of using memory implicitly or without intention. Jacoby and Kelley (1987, citing Polyani, 1958) distinguished the use of memory as an object for examination from the use of memory as a tool for perception and interpretation,

a helpful distinction in the context of considering cognitive habits. Both uses of memory—object and tool—can become biased out of habit.

To refer to memory as an object (explicit memory) is to communicate awareness that the content of one's thoughts derives from a past event. Episodes from one's personal past can come to mind habitually, sometimes uninvited (but with full awareness of their temporal status) and sometimes deliberately and repeatedly sought. At the end of this section, I examine the well-documented tendency for depressed persons to remember negative episodes from their biographical past. Depressed persons habitually remember the bad.

Habits of remembering negative events also show up in the laboratory. On tests of explicit memory, the tendency to think negatively can facilitate the deliberate remembering of experimental materials from the same conceptual neighborhood. On tests ostensibly unrelated to memory (implicit or indirect tests of memory), performance can also reflect habits of prior preferential processing. The experimental goal in both cases is to control the initial experience intended to operate as tool or object on the test (i.e., the experience to be "remembered"); however, the autobiographical method obviously lacks such control over the initial experience. In experimental studies, at least we know the characteristics of the immediate experience to be remembered. Yet it is important to keep in mind that the power of any mood-congruent effect—experimental or autobiographical—no doubt lies in uncontrolled, pre-experimental habits of thought.

### *Memory-as-Object in the Laboratory*

If we present positively and negatively affective words in a first experimental task and later ask the depressed and nondepressed participants to recall those words, chances are good that recall will in some way be congruent with mood. (See the meta-analysis by Matt, Vazquez, & Campbell, 1992.) Maybe the differences will be lopsided, especially in the case of dysphoria, with dysphoric participants recalling fewer positive words but the same number of negative words as nondysphoric participants do. Likely, the differences will obtain only for words encountered conceptually in the first task. In fact, some evidence suggests further restrictions to words considered in relation to the self (e.g., Bradley & Mathews, 1983; Derry & Kuiper, 1981; Dobson & Shaw, 1987). These limitations support the claim that habits of thought play a role in producing mood-congruent recall.

Habits likely play a large role during the test itself. An illustration is the experiments performed by Murray, Whitehouse, and Alloy (1999). They found evidence of mood-congruent recall following a self-referential task, but only when participants were not required to guess in order to produce a criterion number of words. When recall was "forced," the mood-related differences vanished. These results should encourage researchers to use a forcing procedure more often. A reasonable hypothesis is that mood-congruent biases influence the

fluency or ease of remembering, but that materials with other meaning can be brought to mind with sufficient persistence or external aid. Such an outcome, however, does not reduce our interest in the ubiquitous findings of mood-congruent recall and their interpretation. Most acts of recall are probably fluency-driven, without prolonged pursuit of additional material.

Several theoretical frameworks have emphasized the greater degree of conceptual processing that depressed persons devote to negative materials. Some approaches propose that elaborative conceptual processing facilitates recall by establishing richer and more diverse retrieval routes (see Williams, Watts, MacLeod, & Mathews, 1988, and the network account by Bower, 1981). According to the framework of transfer-appropriate processing (Morris, Bransford, & Franks, 1977; see Roediger & McDermott, 1992), mood-congruent recall is established by the match between conceptual elaboration during the initial task and the conceptual basis of the attempt to remember. This account can be extended to include a third type of "occasion": prior habits of thinking. Predated by such habits, negative self-referential material comes to mind with greater fluency, either during the initial episode to be remembered, during the test itself, or on both occasions.

Probably more often than we realize, however, evidence for mood-congruent recall of conceptually processed material is not obtained. Can a consideration of cognitive habits suggest boundary conditions for the mood-congruent effect, at least on a post-hoc basis? Among others, Parrott and Spackman (2000) have written about the tendency for some people in negative moods to attempt mood repair by deliberately thinking positive thoughts. Indeed, evidence for mood-incongruent recall might result from these attempts, as reconfirmed recently by Rusting and DeHart (2000). They instructed some participants to keep focusing on negative events (imagined vignettes for specified words or autobiographical episodes) used to induce negative mood, much like what one does in rumination. Other participants were instructed to engage in positive reappraisals of those events. Subsequent recall was mood-congruent for the former participants and mood-incongruent for the latter. These participants were not depressed; nevertheless, the results provide a model for what might happen naturally when depressed persons develop either set of cognitive habits.<sup>1</sup>

The literature on depression and mood-congruent recall is substantial. Many studies now conducted to examine depression-related biases in other types of cognitive tasks often include a demonstration of mood-congruent recall for comparison (e.g., Watkins, Mathews, Williamson, & Fuller, 1992). There are also published reports of mood-congruent recognition in depression (e.g., Wenzlaff et al., 2002), even one that reports mood-related differences in event-related potentials during the initial task of rating pleasantness, as well as during the recognition test (Deldin, Keller, Gergen, & Miller, 2001). Different levels of brain activity should indeed inform our understanding of mood-congruent memory, but they do not necessarily reveal the causal mechanisms underlying

ing the dispositions for negative interpretations. Habits might serve as instigators, outcomes, or both.

### *Memory as Tool*

In the last decade of the 20th century, a number of experiments on implicit memory in depression were published (e.g., Bazin, Perruchet, De Bonis, & Féline, 1994; Danion et al., 1991; Denny & Hunt, 1992; Elliott & Greene, 1992; Hertel, 1994; Hertel & Hardin, 1990; Watkins et al., 1992). Some of these experiments were not designed to address mood-congruence. But others varied the emotional valence of the materials in attempts to determine whether mood-congruent memory would be revealed on indirect tests, in situations in which people presumably are not trying to remember. In the same experiments that produced mood-congruent recall, there was at first a notable failure to find mood-congruent differences on indirect tests. Some researchers anticipated this outcome, predicting that prior conceptual processing, so advantageous for strategic retrieval tasks, is unimportant for nonstrategic indirect tests (e.g., Williams et al., 1988). If mood-congruent memory relies on differences during initial conceptual processing, mood congruence—like other conceptual manipulations, in this line of reasoning—should not characterize performance on indirect tests (also see Denny & Hunt, 1992).

An exception to the initial rule was reported by Ruiz-Caballero and González (1994), who found evidence of mood congruence on a stem-completion task. In this indirect test, beginning letters of both previously read words and new words are provided, along with instruction to complete the stems with the first words that come to mind. Such a test can easily be turned into an explicit test of memory-as-object if participants begin to use the stems as cues for deliberate recall, even on occasional trials (see Watkins et al., 1992). Responding to these concerns about the process purity of the test, Ruiz-Caballero and González manipulated intention to learn in a second experiment. This manipulation affected levels of free recall (which followed stem completion), but not levels of “priming” on stem completion, although performance on both tests showed evidence of mood congruence. If the participants engaged in deliberate recall on the stem-completion test, the authors argued, performance on that test should have shown effects of intention to learn. But, as Chapman and Chapman (1973) alerted us, the two memory tests might be differentially sensitive to the manipulation of intention to learn, while showing similar differences according to emotional valence. The provision of stems might compensate for the lack of intentionality in the unintentional condition and thereby overwhelm the effect of intentional learning, while nevertheless cuing recall in mood-congruent ways. Therefore, doubts about mood-congruent uses of memory as tool remained.

Evidence for mood-congruent memory from tests of stem completion is surprising, particularly to a reader in a transfer-appropriate-processing frame of

mind. Among others, Roediger and McDermott (1992) discussed the importance of the match between types of processing at “study” and test. Mood-congruent thoughts during initial exposure should facilitate similar *thoughts*, but not perceptions, at the time of testing, regardless of whether memory is used as tool or object. Word-stem cues should function more perceptually than conceptually. Therefore, mood-congruent performance on stem completion should not occur. In hindsight, it now seems clear that prior habits of reading mood-congruent words can sometimes facilitate performance on so-called perceptually driven tests (e.g., unprimed word identification, as used by Von Hippel, Hawkins, & Narayan, 1994, and stem completion of both old and new items, as reported by Bazin et al., 1994). Nevertheless, it was rare to see or to expect to see evidence of mood-congruent memory on tests lacking a substantial reliance on conceptual processing.

Taking Roediger and McDermott’s (1992) suggestion to use conceptual indirect tests, Watkins and his associates (Watkins, Martin, & Stern, 2000; Watkins, Vache, Verney, Muller, & Mathews, 1996) have found mixed evidence of mood-congruent performance by clinically depressed participants. Watkins et al. (1996) found it on a test of free association, but there was no accompanying assurance against contamination by explicit remembering. Using both perceptual and conceptual indirect tests, Watkins et al. (2000) found evidence of mood congruence following a conceptual orienting task, but only on one conceptually driven test, the test they called word retrieval (in which one produces words when cued by dictionary definitions). Again, we can’t be sure that participants were unaware of the memorial nature of the task or that they did not attempt to remember deliberately if they were aware.

Contamination on indirect tests by deliberate remembering should not undermine interest in the many ways that habits of thought can influence memory. No doubt, all tests that reflect prior experience do so through a mixture of automatic and recollective processes (see Jacoby, 1991). Even so, it is important to know whether instances in which memory is used *primarily* as a tool for understanding current experience are affected by habits of negative thinking in depression, and in this regard more evidence is needed. Obtaining that evidence in the laboratory is likely made more difficult by problems in controlling the thoughts that should come to mind on indirect tests. Finding conceptual tests that do not invite deliberate uses of memory as object and, at the same time, produce effects that override other sources of fluency from the past has been difficult. Thinking of words from definitions might work because other words cannot be used, but tests of free associations may invite too many extra-experimental responses. In other words, memory-as-tool is hard to control experimentally.

A general-purpose or prototypical tool might work better in experimental demonstrations of implicit bias. Past habits of thinking influence performance on current tasks not only because the exact thought keeps returning (the real-world analog for the indirect test of memory as tool) but also because past-



related thoughts guide current thoughts. Recent experiments in my lab illustrate this point (Hertel, Mathews, Peterson, & Kintner, in press). An initial "training" phase was designed to encourage either negative or nonnegative interpretations of homographs as participants judged semantic relatedness (e.g., *pursue* vs. *celery*, in relation to *stalk*). The subsequent task directed participants to form images of individual words, none of which had been used during training and many of which were homographs with both negative and nonnegative interpretations; performance in this task reflected the bias established during training. The training phase in this line of research is intended to model what happens naturally when prior habits of thought influence current interpretations in emotionally biased ways. The influence itself is an example of memory, put to use as tool, although we tend not to think about it that way. Our typical impressions about memorial influences more often occur in conjunction with being reminded about our personal past.

### *Memory as Autobiographical Experience*

Habits of thought and rumination often include memories of events from the personal past. Some of the earliest evidence for mood-congruent memory in depression was obtained in autobiographical studies (e.g., Clark & Teasdale, 1982), with accompanying interpretations that related mood congruence to habits of thinking. Now, direct evidence of this linkage is available. Using the same set of ruminative or distracting procedures previously used to affect the temporary mood of dysphoric students, Lyubomirsky et al. (1998) produced differentially negative biases in autobiographical recall.

In experiment 1, Lyubomirsky et al. (1998) randomly assigned dysphoric and nondysphoric students to engage in 8 minutes of rumination or distraction and then requested free recall of events from their lives. Following recall, the students rated the hedonic tone of the memories they produced. Dysphoric students who had ruminated prior to recall rated their memories as less positive and more negative than students in the other three conditions did. The same pattern of results was obtained in experiment 2, in which the students were prompted to recall two happy and two unhappy events, and in experiment 3, in which the students judged frequency of occurrence in their lives for 10 positive and 10 negative events listed by the experimenter. In experiment 4, students were instructed to think aloud during the rumination or distraction phase, and their thoughts were recorded. The first six autobiographical memories mentioned in the tapes were rated for negativity and unhappiness by independent judges. The same pattern of mood congruence occurred: dysphoric students who ruminated produced more negative memories, compared to those who were distracted and compared to nondysphoric students in both conditions. All experiments also produced the pattern of effects on mood ratings described previously in this chapter: only the dysphoric students felt more or less sad and depressed as a function

of rumination or distraction, respectively. In summary, ruminative thoughts not only affected mood; they also invoked or contained more negatively toned memories from the dysphoric students' personal pasts.

The experiments by Lyubomirsky et al. (1998) could not address the precise nature of the mood-congruent finding. The authors acknowledge difficulties in concluding that the effects in the first three experiments pertained to memory instead of merely to ratings exaggerated by rumination. And, of course, in any autobiographical study, we cannot be sure that the memories are accurate (although accuracy issues do not trump all other interests in bias). So, with these qualifications, it is reasonable to conclude that ruminative habits encourage negative thoughts about the past. Especially those students with a reason for focusing on negative past events were led to do so by a brief ruminative episode. Making a similar point, Rothkopf and Blaney (1991) found clearer evidence of mood-congruent autobiographical recall when students filled out the BDI prior to the recall test rather than at other times. One interpretation of this type of result points to demand established by the statements on the BDI. Another interpretation, however, posits that a depressed person must become aware of her depressed state for the ruminative memories to be invoked. The self-schema must be "activated" (Beck, 1967). Caught unaware of self, he might sidestep habits of remembering the negative, and then other characteristics of the situation could more powerfully guide performance.

The notion that a schema or prototype guides attempts to remember is consistent with a second major characteristic of autobiographical memory in depression, that is, its tendency to be overly general, as if attempts to remember events from one's life stop short at the categorical level (see the review by Healy & Williams, 1999). Williams, Teasdale, Segal, and Soulsby (2000) provide the example of the cue word "kindness" eliciting the following memory: "My grandmother was always kind to me. She used to take me out when my father got cross" (p. 150). The response referred to a category of events instead of to a (requested) specific memory. Both positive and negative autobiographical memories tend to be described at this categorical level by depressed people (as well as by those who suffer from posttraumatic stress disorder; see chapter 4). This tendency might reflect an unconscious habit or a conscious strategy to avoid emotion associated with specific details (Williams et al., 2000).<sup>2</sup> As with so many aspects of depressive cognition, the direction of cause is not at all clear. An overly categorical pattern of thinking and remembering might very well contribute to onset of depressive episodes, as suggested by Beck's (1967) theory and by hopelessness formulations of depression (Abramson, Metalsky, & Alloy, 1989). Whatever the origin, the style is not so habitual that it cannot be modified (Williams et al., 2000). There is even evidence that a focus on specific experience (instead of abstract analysis) can at least temporarily reduce the categorical extent of autobiographical memory (Watkins & Teasdale, 2001). Building new habits to recruit specific instances can deflect a habitual dark-cloud schema and reveal a differ-

ent self to the rememberer. Of course, this assumption has long been incorporated into the techniques of cognitive-behavioral therapy.

### *Summary*

When past events serve as the objects of current thought, these thoughts are both more negative and more abstract for depressed people than for others. Habit's role in explicit memory bias is depicted in results from manipulations of self-referential processing and rumination. When memory is being used as a tool for other purposes, however, convincing evidence of similar bias has not yet been established for specific events, even though common sense tells us that these unintended effects are ubiquitous. After all, these cognitive habits are nothing other than the nondeliberate influences of past conceptual experiences during current, similar conceptual acts. Interpretive biases, surely established primarily by past experience, *are* well documented in depression.

A primary question about the influence of cognitive habits on both forms of memory concerns the extent to which the influence relies on awareness of one's mood state. Tasks that occur prior to tests for mood-congruent recall include self-referential judgments of trait words, self-referential images, ruminative training, and a variety of mood-related forms and inventories. These tasks are guaranteed to make one consider one's mood state. The distracting phrases used by Lyubomirsky et al. (1998) might sidestep mood congruence not merely because mood is temporarily improved but also because other habits of thinking have not been recently exercised. A continuing task for future research is to ask whether negative biases can be invoked without awareness of self.

Interpretive and memory biases are not always symmetrical with mood. Depending on the type of "depression" and on the nature of the materials, the depressed participants do not always recall more negative words than positive words, but they do fail to show the positive bias in the nondepressed group. Sometimes they recall negative materials at the same level as the nondepressed group (but fewer positive words). In part, these asymmetries reflect other differences associated with mood and memory—differences in the degree to which controlled, strategic thoughts are initiated and used. This is the other side of the "habit" coin.

## Impaired Control in Nonhabitual Tasks

Deficient cognitive control sets the stage for habits to emerge. At the same time, thoughts that habitually occupy attention leave little mental room for thoughts about anything else. These assertions of a reciprocal relation between habits of thought and controlled attention characterize theoretical approaches to memory

in depressed states, particularly when the topic pertains to impaired performance. Memory impairment is one of the frequent complaints of people in depressed states (Beck, 1967).

“Control” refers to the operation of cognitive procedures at the opposite end of the continuum from habit (see Jacoby, Jennings, & Hay, 1996). Controlled procedures are initiated with awareness or intent, and their components are not well integrated. From a phenomenological perspective, an individual must decide what to do or think next—quite a strain in depression. No wonder that *effort* metaphors have been used so often in descriptions of depressed participants’ difficulties in tasks that require or reflect control (see Hasher & Zacks, 1979; Weingartner, Cohen, Murphy, Martello, & Gerdt, 1981).

### *Effortful Construction of Memory as Object*

The idea that depressed people have trouble carrying out effortful mental procedures emerged first in early studies of intellectual functioning. (See the review by Hartlage, Alloy, Vazquez, & Dykman, 1993.) Only after attention theorists (e.g., Posner & Snyder, 1975) began to write about the control of attention, however, did researchers begin to connect effortful or controlled processing to performance on memory tests (Hasher & Zacks, 1979; Tyler, Hertel, McCallum, & Ellis, 1979). In a nutshell, the idea was that the more effortful or attention-demanding the process, the more likely that the product would be remembered. Like the levels-of-processing framework popular among memory researchers at that time ( Craik & Lockhart, 1972), the connection of cognitive effort to memory was based on assumptions about the strength of memory traces or links in an associative network. In the case of *effort*, however, strength was thought to directly reflect the amount of attention or effort expended during initial processing, instead of the type or level of processing. Orienting tasks vary in the degree of effortful, attention-demanding processes required to complete them; those requiring more effort supposedly produce a stronger memory. This idea was not unlike the idea of *difficulty*, but *effort* referred to a characteristic of processing, not the task itself. Effort-inducing tasks inspired or required more focused concentration, as revealed by longer latencies to perform a simple secondary task (e.g., Tyler et al., 1979).

The applicability of the effort-memory connection to depression was a central feature of Hasher and Zacks’s (1979) often-cited work. Since then, literature reviews and a meta-analysis have supported the idea that depression-related deficits in memory occur primarily when the initial orientation task requires controlled concentration (Burt et al., 1995; Hartlage et al., 1993). Hartlage et al. also described the variety of theoretical accounts of effort’s role in depression-related impairment. Condensed and simplified, one account connects the concept of reduced attentional control to abnormal frontal function. (See

Davidson, 2000, for a more recent review.) Another claims that effortful processing is limited by the allocation of resources to personal concerns, presumably for the duration of the depressive episode (e.g., Ellis & Ashbrook, 1988). Implicit or explicit in all effort accounts is the assumption that greater effort produces a memory trace that is more easily found when needed. This assumption, rarely stated quite so simply, is clearly too simple in any form.

The ability to focus attention and concentrate—either because the neurotransmitters are fully supplied to the appropriate areas of the brain or because other matters are not more compelling—likely has beneficial consequences for memory, but only when those particular procedures are subject to replication on the test. The intensity of concentration is important to memory only in the sense that it must be sufficient to carry out the procedures that will later, when replicated, benefit performance on a memory test. According to a transfer-appropriate-processing perspective, research should examine that sufficiency, as well as the match in attentional *focus* across the occasions of initial exposure and memory test. One obvious way to evaluate the transfer-appropriate claim is to examine the literature on memory as tool-versus-object in depressed states, because both the need for controlled attention and its focus varies across types of tests. If depressed people do not focus on aspects that will later guide performance on memory tests, and if they do not concentrate sufficiently for later replication, performance should suffer, regardless of the “intentionality” of the test or its difficulty.

### *Appropriate Use of Memory as Tool or Object*

Indirect tests of memory are designed to elicit automatic or habitual use of prior experience and often do not require concentrated effort during their performance. Spelling homophones is an example of such a test. It takes little concentration to spell common words read aloud by the experimenter at a fast pace (e.g., week/weak). Similarly, the orienting tasks prior to the spelling test often require little concentration on one of the two alternative meanings (e.g., while listening to the question: Name the days of the week). Simple spelling and comprehension use habitual procedures. As expected, the dysphoric students' spelling performance matched that of controls in effects of question-biased meaning; yet in the same experiment, the subsequent use of recognition strategies was impaired in the dysphoric group (Hertel & Hardin, 1990).

On the other hand, memory can operate as a tool in performing somewhat more attention-demanding tasks. Even stem- and fragment-completion tests, when not performed habitually, might function as puzzles that require at least momentary effort and concentration, yet the available reports show no evidence of depression-related impairment (in the same experiments that revealed impaired free or cued recall of nonnegative words; e.g., Bazin et al., 1994; Denny

& Hunt, 1992; Ruiz-Caballero & González, 1994; Watkins et al. 1992).<sup>3</sup> Why should we not see occasional evidence of impairment? One possible reason is that it is sufficient to have focused attention on the look or sound of the words in the orienting task in order that memory operates as a tool during perceptual indirect tests—tests that might well demand concentration on seeing or hearing them again. Sustained processing of meaning does not boost performance, but any task that discourages attention to words as units might decrease it. For example, consider an experiment that used a word-identification test, in which previously presented and nonpresented words were displayed very briefly and back-masked, and the task was merely to try to name the words. Anyone who has tried these tests knows that they require focused attention to “see” the words. To what extent should identification benefit from prior exposure (memory as tool)? In the orienting task of one such experiment (Hertel, 1994), I asked participants to evaluate some words according to the degree of roundness in their letters. The words evaluated in this task were identified more frequently on the subsequent perceptual test than were words not previously exposed, but this effect was smaller for the depressed participants! A reasonable postdiction is that during the orienting task the depressed participants attended less often to the words as integrated units and so were disadvantaged in naming them on the test. Word identification benefits from prior lexical processing, even as it requires concentration or effort.

Conceptual processing facilitates use of the same concepts later on. Conceptual implicit tests require prior attention to meaning and therefore should reflect the extent to which meaning has been fully attended. For example, Jenkins and McDowall (2001) found a depression-related impairment on both free recall and the indirect test of category association, but only for the words that had been generated from antonyms (vs. merely read) during the orienting phase. No clear evidence of impaired fragment completion was found for either the previously generated or previously read words. These results are not as unambiguous as I describe them; for example, baseline performance on the category-association test was low for the depressed group. Nevertheless, the pattern illustrates the importance of transfer-appropriate conceptual processing. And the results also suggest that the depressed participants' conceptual processing during antonym-generation was insufficient to support the later production of those concepts during recall or category association. Whether category association functioned purely as a test of memory as a tool cannot be assured, of course. Like the free-association task used by Watkins et al. (1996), it might have been contaminated by attempts to remember, particularly in the nondepressed group. Because other category associates are available, the depressed participants could perform the test without concentrating on the past and, therefore, without showing the benefit of prior generation of category members, and a mood-related impairment would thereby result.

Depressed people are less likely to devote effort to thinking about the past when the current task can be performed without doing so. This claim receives indirect

support from a series of problem-solving experiments in which memory for similar past problems operated as tool or object in facilitating solutions for current problems (Hertel & Knoedler, 1996). The logic-based word problems were themselves attention-demanding and quite difficult without prior experience in learning how to solve similar problems. During training, problems were presented for solution attempts, and each (almost always unsuccessful) attempt was followed by experimenter-provided instruction in how to solve that problem. Following the training phase, a series of structurally identical but superficially dissimilar target problems was presented, always without such instruction. Because we were curious about how memory operates as a tool in problem solving, we included a condition to measure spontaneous transfer; in this condition, the training problems were not mentioned during the target series. We also included a condition in which we provided very specific cues and instructions for using memory for the structurally similar training problem "as object" just prior to presenting each target. In two experiments, these hints for recalling the prior analogy actually disrupted performance by the nondysphoric students. Focusing attention on the details of the past problem while solving a new one seemed to be a transfer-inappropriate use of prior experience; in comparison, more targets were solved when memory for the analogy was allowed to operate as a tool. The dysphoric students performed similarly well, with or without hints to think back, which led us to suspect that they did not sustain attention to the relevant past problem and therefore were not led astray in transfer-inappropriate ways. Attending to important features of the target problem itself benefited from earlier attention to those features of the analog.

In predicting performance in the problem-solving experiments, Knoedler and I initially reasoned that if the nondepressed students' solution rates were similar with and without hints, they might have been using memory as object on their own initiative in the no-hint condition. If this pattern were obtained, we expected to find depressive impairments. When the hints turned out to be detrimental for nondepressed students, we inferred that memory for training problems in the no-hint condition operated spontaneously as a tool. In reasoning this way, we did not truly believe that either use was "all or none." Similarly, most researchers understand that memory usually operates as both tool and object in a variety of memory tasks and that memory tasks are not "process-pure" (Jacoby, 1991). Yet when no attempt is made to determine the degree to which one use of memory contaminates the other use, reasoning about the role of controlled attention in depressive memory is made more difficult. Luckily, Jacoby's process-dissociation procedure directly addressed the problem of how to examine the separate influences of tool and object memory.

The central method used by Jacoby—and others, subsequently—entails two conditions of instructions: one in which automatic or habitual uses of memory operate in concert with controlled attention to the past and one in which they operate in opposition to each other in producing a response. In recognition tasks,

for example, participants are instructed to endorse items that either feel familiar or are recollected from a specific prior task on *inclusion* trials, whereas on *exclusion* trials, they are instructed to reject items from that specific task while endorsing other old items. In the inclusion case, recognition hits are produced by both controlled memory for specific prior occurrences *and* habitual procedures of reading or thinking words that were earlier read or thought. The uses of memory operate in concert. In the exclusion case, however, items from the specific prior task are (erroneously) endorsed only if they produce a feeling of familiarity in the absence of memory for source as object. Habit and control operate in opposition to each other. When independence of the two classes of influences can be assumed, their estimates can be computed from the proportion of positive recognition responses under the two instructional conditions. The relevance of these procedures to depression-related impairment should be obvious: Unless habits are disrupted during orientation, habitual use of memory as tool should remain intact, and only the estimates of controlled uses of memory as object should reveal the impairment. This indeed is what we found on recognition tests following a conceptual orienting task (Hertel & Milan, 1994). The dissociation was replicated through similar procedures designed for conceptually cued fragment-completion tests (e.g., building-s\_o\_e) following the reading of meaningful cue-target pairs in the orienting task (e.g., building-stone), (Hertel, 1998; also see Hertel & Meiser, 2000, for a multinomial model applied to those results). Again, the importance of transfer-appropriate attention across orienting task and test is illustrated. To the extent that participants attended to the connection between the cue and target initially, they would be able to attend to it as an object in the past, including the target or excluding it when required by instruction. A less careful focus on the pair initially would make it harder to both exclude and include deliberately on the test. The component of memory that represents the past as the object of attention is the one that shows a deficit associated with depression. However, the mere reading of the word pair during the orienting task makes the target available later, as a completion of the fragment, in the presence or absence of controlled recollection, and this habit-oriented component of memory was unimpaired. Thus, attentional control is indeed a factor in producing memory impairment in depression, when performance relies on the replication of focus across the two occasions.<sup>4</sup>

### *Habit as Detriment to Control*

Poor performance often reflects absence of habit in performing a cognitive act. This is why controlled attention is required—to do the nonhabitual and think about things one does not usually think about. Seemingly, all of the reported cases of depression-related impairment involved nonnegative materials—materials unrelated to the personal concerns thought to occupy attention habitually in depression. Habits of negative thinking benefit the controlled use of memory



for related stimuli, as is the case on tests of mood-congruent recall, but otherwise they can detract. Therefore, attentional control in depression should depend on the suppression of habitual thoughts in the service of focusing elsewhere. A line of research begun by Hasher and Zacks (1988) has shown evidence of inhibition difficulties associated with aging that might also characterize depression. Like effort-related difficulties, inhibitory difficulties in depression could logically arise from fundamental frontal dysfunction, from specific concerns associated with the depressed state, or from both (see Hertel, 1997).

Reliance on an *inhibition* construct is not the only way to represent the problem of impaired control in the context of habitual thinking. We might slightly shift perspective to propose that control is made more difficult when other habits are strong. Habits of attending (e.g., to negatively toned events) might make the act of disengaging attention more difficult than it otherwise might be in the course of turning attention to a different event. At this stage of research, however, the aptness of the metaphor (inhibition vs. disengagement) is less important than gathering evidence for depression-related difficulties in turning away from habit-related stimuli in order to do something else.

The "something else" in experimental studies has often been the task to respond to a dot or color patch in a screen location that differs from the one occupied by a mood-relevant word (e.g., Bradley, Mogg, & Lee, 1997; McCabe & Gotlib, 1995). Bradley et al. found dysphoria-related biases under conditions of suprathreshold but not subthreshold exposures to the words. They argued that the problem was therefore one of disengaging attention, because a bias in *allocating* attention to relevant stimuli would pertain for both exposure conditions.

Recently, investigators have used the negative-priming paradigm to examine depression-related difficulties in disengagement or inhibition. In the standard version of this paradigm, items to be attended and ignored are presented concurrently on each trial, with the attended item on trial X sometimes having served as the ignored item on trial X-1. When the ignored is subsequently attended, or even when the same category of the ignored is now the category of the attended, the judgment for trial X is slowed, compared to control conditions. This slowing (called negative priming) is attributed sometimes to inhibition of the ignored item or category and sometimes to transfer-inappropriate attention (Neill & Mathis, 1998). If depressed people have trouble disengaging from mood-related thoughts, negative-priming effects should be reduced or absent. Some suggestion of this difficulty has been demonstrated in a simple letter-identification task after students were induced by music to feel sad (von Hecker, Conway, Meiser, & Holm, 2002). However, Joormann (in press) has used a more conceptually relevant task. She asked nondysphoric and mildly dysphoric students to judge the self-relevance of negative and positive targets while ignoring distractors of the same or opposite valence. All participants took longer to judge the self-relevance of positive words when positive words had been ignored on the previous trial, compared to previous trials of ignored negative words. This finding

roughly corresponds to the typical negative-priming effect. The same pattern of negative priming was obtained for nondysphoric participants in judging negative items after having ignored negative (vs. positive) items, but it was not obtained for mildly dysphoric participants or for those who reported prior episodes of depressed mood. The difference in these patterns suggests that the participants who tended currently to be in more negative mood states (or reported feeling depressed in the past) ignored the negative adjectives less successfully.<sup>5</sup>

Difficulty in disengaging attention from negative material is more clearly documented in connection with anxiety disorders or high levels of trait anxiety (see Fox, Russo, Bowles, & Dutton, 2001). Again, when researchers use scores on inventories like the BDI or even when they use diagnostic labels to form groups for experimental purposes, their dysphoric or depressed participants are likely to be anxious. In the other direction, ruminative habits more typically attributed to depression also typify anxious states or traits (Nolen-Hoeksema, 2000). Regardless of their lack of specificity to depression, however, habits of dwelling on the negative have consequences for memory beyond those reported in relation to evidence for mood-congruent memory, and these consequences are not always desirable.

One consequence might be trouble in forgetting. Not only do depressed people have trouble ignoring mood-congruent material when they focus on other material presented concomitantly (as in Joormann's negative-priming studies), they also less successfully suppress mood-congruent material in more sustained attempts. Evidence for difficulties in sustained thought suppression has been documented by Wegner, Wenzlaff, and their colleagues (for review, see Wenzlaff & Bates, 1998). Thought suppression, whether accomplished directly or indirectly in the service of thinking about something else, plays an important role in forgetting (see Anderson & Neely, 1996). And forgetting can be a valuable outcome, particularly for the depressed person who might prefer not to ruminate about past events beyond one's control.

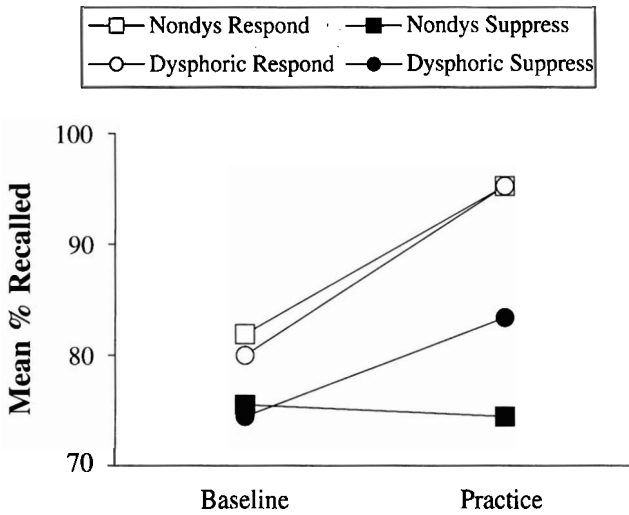
Intentional forgetting has been studied in the lab by directing participants to forget items or lists of items.<sup>6</sup> Clearly, instructions to forget lists can have their intended effect, particularly when the participants are given something else to think about. To document effects of direct suppression on individual items, Anderson and Green (2001) developed the "think/no-think" procedure. After learning pairs of unrelated words to a fixed criterion, the participants were given a varied number of trials (0, 1, 8, or 16) to practice the retrieval of the second member of some pairs and to practice the suppression of the second member of other pairs. The first member of each pair was presented as a cue for either retrieval or suppression. This practice phase was followed by a final test of cued recall, in which participants were instructed to recall all of the response words, regardless of previous instruction. In several experiments, the main finding was increased forgetting as a function of practice in suppression, both when the original studied cues were used at test and when new cues related categorically to

the response words were used at test. The simple story is that people can successfully suppress to the point of incurring forgetting. Can depressed people do this as well as others? Melissa Gerstle and I have recently conducted an experiment to answer that question (Hertel & Gerstle, in press).

To investigate the possibility of mood-congruent suppression, we replicated the procedures developed by Anderson and Green (2001), but with one major change: The cues we used throughout the experiment were adjectives related to the target nouns. On half of the pairs, the adjectives gave the essentially neutral nouns a negative meaning, and on the other half, the meaning was positive. (The materials were fully counterbalanced, e.g., gloomy cottage vs. splendid cottage.) To encourage initial attention to the emotional valence of the materials, in the learning task we instructed participants to construct a self-referential image for each pair and to rate the meaningfulness of the image. These materials and instructions had been used earlier in a recall experiment without suppression instructions, together with other materials in which a third set of adjectives produced neutral concepts when paired with the same nouns (e.g., plain cottage; Hertel & Parks, 2002). In that experiment, dysphoric and nondysphoric participants alike recalled the nouns when they had been given emotional meanings (both positive and negative) more often than when they had been given neutral meanings. In the suppression experiment, Gerstle and I also found that recall was not significantly associated with emotional valence for the dysphoric participants (although the controls showed more forgetting of nouns from positive pairs). More important, however, was our finding that the effect of practicing suppression on later recall was significantly reduced in the dysphoric group. The dysphoric participants recalled as many of the rehearsed items as did the non-depressed participant and significantly *more* of the targets that they had practiced suppressing, regardless of the cues' valence (see fig. 6.1).

Similarly, Power, Dalgleish, Claudio, Tata, and Kentish (2000) found evidence for depression-related difficulties in one of their three experiments on directed forgetting. Perhaps because their participants were clinically depressed (experiment 3), however, this difference was restricted to negative adjectives. Recall of positive adjectives—to be remembered or to be forgotten—was no better or worse than that of anxious participants and controls.

At the same time that depressed people might have trouble deliberately forgetting self-referential thoughts, they also have trouble remembering what they had been thinking about prior to an episode of self-referential rumination. At least this is true for the controlled component of memory, as estimated through process-dissociation procedures on a test of cued fragment completion (Hertel, 1998). In the experiment previously mentioned, we inserted what might be seen as an interference phase between the initial orienting task of reading word pairs and the final memory phase. We assigned a third of the dysphoric and control participants to merely sit and wait for 7 minutes, another third to ruminate, and the final third to think about other matters, such as geographical locations. The



### Intervening Task

Figure 6.1. The mean percentage of targets recalled on the final test, after depressed and nondepressed participants had practiced retrieving or suppressing them in response to cues. (Adapted from “Depressive Deficits in Forgetting,” by P. T. Hertel and M. Gerstle, in press, *Psychological Science*. Copyright © 2003 by the American Psychological Society.)

latter two groups actually underwent the rumination or distraction procedures used by Nolen-Hoeksema and Morrow (1993) that I described elsewhere in this chapter. Following the period of self-focus in the rumination condition, the dysphoric participants showed impaired control on the memory test (relative to the other participants), much like those who simply waited during the 7-minute interval. However, the participants who thought about objects and locations showed no depression-related impairment in control (see fig. 6.2). In addition to improving mood under some conditions (e.g., Lyubormirsky et al., 1998), distraction also seems to improve controlled attention to the past when the rememberer is depressed. And because the distracted group showed no impairment, it is tempting to infer that even those who merely waited for 7 minutes focused on sufficiently compelling matters that thinking back during the memory test was made more difficult.

Inherent in those results (Hertel, 1998) are the final two points of this chapter: situations that permit mind wandering invite habitual thinking and impair memory for other matters. Deficient performance is not, therefore, an inevitable outcome of depression, because habits can be opposed in ways that benefit control.

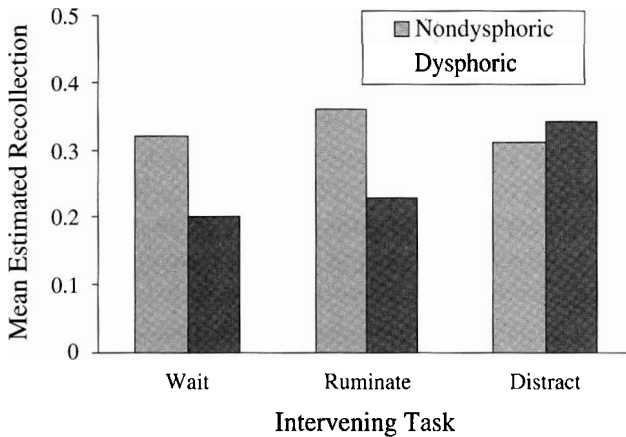


Figure 6.2. The mean estimate of controlled retrieval by dysphoric and nondysphoric participants, following an intervening period of waiting for 7 minutes, entertaining ruminative thoughts, or entertaining distracting thoughts. Adapted from “The Relationship between Rumination and Impaired Memory in Dysphoric Moods,” by P. T. Hertel, 1998, *Journal of Abnormal Psychology*, 107, p. 170. Copyright © 1998 by the American Psychological Association.

## Opposing Habit Through Control

Here is the prototype of the depressed rememberer as constructed by the findings described thus far: she (well, yes, *she*) is someone who habitually ruminates about personal concerns and other negative events and whose interpretations and perceptions reflect those habits; someone who tends to remember negatively affective events more often or remembers events as more negatively toned; and someone whose memory for neutral or positive events is occasionally impaired, at least when attention is allowed to stray to habitual patterns. This person seems to have little cognitive self-control. (One can almost hear her grandmother’s admonishments.)

I use “self-control” to imply that the most important aspect of impaired control in depression is control initiated by the self. Controlled attention to any stimulus can be facilitated by the environment; the structure of the task, stimulus salience, and its interest value are some of the relevant dimensions. Cognitive self-control is merely a convenient term for referring to the focusing, switching, and sustaining of attention under conditions where stimulus and task dimensions do not play obvious roles. In structural terms, self-control is loosely analogous to the central executive component of working memory (Baddeley & Hitch, 1974). Its physical components are frontal functions; indeed, much of the evidence for depression-related differences in brain activity implicates activity in the prefrontal cortex (see Davidson, 2000; Heller & Nitschke, 1998). Similar

behavioral evidence is supplied by Channon (1996), who found impairments on a neuropsychological test of frontal function—the Wisconsin Card Sorting Test (WCST)—even in a sample of dysphoric college students. Furthermore, by statistically controlling for correlations with BDI scores, Davis and Nolen-Hoeksema (2000) found WCST differences associated with the tendency to ruminate. Self-reported ruminators made more perseverative errors on the WCST and failed to maintain set more often than did nonruminators. In a basic sense, then, cognitive self-control is a problem in depression, as well as a problem for people who tend to ruminate.

A good simple example of the memory problems associated with depressive deficits in self-control or initiation is impaired prospective memory in the absence of reminding cues (Rude, Hertel, Jarrold, Covich, & Hedlund, 1999). Depressed and control participants were instructed at the start of the session to press a function key every 5 minutes during their performance of an ongoing test of general knowledge. The depressed participants checked the time less often and thereby made more errors on the prospective task.

Reduced self-control affects performance in memory experiments under conditions of poor external control. For example, dysphoric students' performance yielded lower estimates of controlled recollection in my cued-fragment-completion study (1998) after a period of lax external control. Doing nothing for 7 minutes presented ample opportunity for mind wandering, because the dysphoric students had more trouble subsequently turning attention to the task of remembering. Although this depression-related impairment in controlled recollection was closely mimicked by data from participants in the rumination condition, it is not certain that the "waiting" students also ruminated during that period. For some, the break from the ongoing experiment might have invited mind blanking. As a learned response to stress, the habit to "tune out" might be just as reflective of poor self-control as the habit to ruminate. Watts, MacLeod, and Morris (1988) found that blanking tended to occur in tasks that involve planning (tapping frontal functions). Although we know too little about blanking in comparison to mind wandering or rumination, either type of habit should take over during periods of lax external control of the procedures to be performed.

As I have argued previously (1997, 2000), lax external control often typifies real-world thinking, and it sometimes characterizes the trials that constitute the orienting task in laboratory experiments. The orienting task is, according to effort metaphors and other processing frameworks, the critical period in determining whether the material will be recalled later. Therefore, in allowing sufficient time on each trial for the elaborative processing that benefits recall, memory researchers also encourage habits of mind wandering or blanking. Years ago, Stephanie Rude and I used a simple manipulation of either allowing an orienting decision to be made at any time during an 8-second exposure or requiring the decision at the end of the trial, along with a repetition of the target word. (The decision concerned whether a target word fit sensibly into a sentence frame.) We called the

two conditions *unfocused* and *focused*, respectively (Hertel & Rude, 1991a). In the focused condition, the materials did not stay on the screen for the 8-second period, as they did in the unfocused condition. To perform each trial in the focused condition, the participants had to hold the word and decision in mind for the duration of the trial, but their minds could wander in the unfocused condition because decisions could be reported early on during the 8 seconds. On the subsequent test of free recall, depressed participants from the unfocused condition performed poorly, compared to their nondepressed counterparts. This deficit, however, was eliminated for participants who had been required to focus during the orienting task.

The depressed participants' ability to perform the task could not ever have been at issue. The task was not difficult in either condition (even though it had been used previously as an example of an effortful orienting task by Tyler et al., 1979, and Ellis, Thomas, & Rodriguez, 1984). Indeed, the more difficult condition clearly was the focused one, because it required sustained attention. Therefore, instead of making the task easier to accomplish, the focusing instruction structured the task transfer-appropriately. Participants were required to attend to the recent past (a few seconds earlier) in the same way that they were later required to attend to the past during the recall test. Moreover, external control compensated for poor self-control by not allowing habits of thought (or no-thought) to carry the day.

There were a number of variations of this attention-focusing procedure (Hertel & Rude, 1991b). We also tried to stiffen the requirements at the time of the test by using a forced-recall procedure. Although "forcing" the participants to write a certain number of words on the recall test merely increased levels of recall for everyone in our experiments, others have found that this procedure eliminated the depression-related deficit (e.g., Murray et al., 1999). The forcing procedure counteracts a possibly conservative response tendency, but it does so by asking the participant to refocus attention on the past events, which might be at least as important as overcoming hesitancy or conservatism.

Other methods of improving performance by providing external support have not always been successful. For example, in the recognition experiment with process-dissociation procedures, Milan and I reinstated the original context word in some test conditions. That procedure boosted estimates of controlled recollection for both dysphoric and nondysphoric participants (Hertel & Milan, 1994). Clearly, the nondysphoric students had done something that we had failed to capture by the manipulation. This was also true when recognition was much more strategically dependent (Hertel & Hardin, 1990). Hardin and I noticed that the nondysphoric students seemed to be using their performance on the prior indirect test of homophone-spelling to decide whether the recognition item had occurred in the original set of questions (e.g., *Week/Weak? Did I just spell that word? How did I spell it? And was that word in a question? Oh, name the days of the week? Yes.*). In a subsequent experiment, we asked participants to answer a similar set of questions before making each recognition judgment. By doing so,

we found a pattern of dependency in the dysphoric group that mimicked the pattern of nondysphoric judgments under unassisted conditions, but the nondysphoric participants who got the set of question cues outwitted us. Their performance improved even for those items that they had spelled in the opposite way (e.g., *Week/Weak? Did I just spell that word? Weak? Is there another way to spell it?*). These and similar differences illustrate the difficulty in predicting exactly what people do under conditions of lax external control, but the findings also show that performance in depressed states can be improved by at least some version of external support. And the main point is that this support works because it forestalls the emergence of cognitive habits in depression—habits that interfere under poorly controlled conditions and make it difficult for the depressed person to take control and show cognitive initiative (see Hertel, 2000).

Habits of thought are difficult to oppose. The historically important construct of habit strength in Hull's theory of learning (1943) was opposed by the construct of inhibition, but Hull's rats experienced immediate consequences—missing reward—that led to the orderly development of inhibitory strength. The consequences of thought are often much farther removed, so suppressing a turn of the mind is perhaps much harder to learn than is suppressing a turn in the maze. Modern approaches to thought suppression acknowledge this difficulty. Wegner's ironic-processes theory (1994), for example, includes a construct called a monitor that checks whether thoughts are being successfully suppressed. According to this point of view, the depressed person's need to suppress self-concerns, particularly during tasks that require self-control and initiative, presumably "activates" the monitor and ironically brings those concerns back to mind. At the very least, any attention devoted to the task of suppression likely disrupts procedures that require sustained attention or planning. Instructions to suppress are therefore much harder to follow when not accompanied by a task that directs attention through external means.

The short version of that argument is that simple self-controlled thought suppression likely does not work well for depressed people, both in the sense of potentiating later forgetting (Hertel & Gerstle, in press) or freeing attention to focus in ways that later benefit remembering. In the latter case, what works best is environmental support, but the world is not often arranged to be helpful. What also seems to work in the sense of improving both memory and momentary mood is a good distraction procedure (e.g., Hertel, 1998; Lyubormirsky et al., 1998). Distraction at least interrupts ongoing habitual thoughts so that the depressed person begins the recall task on even footing. There is even some reason to wonder if reappraisals of intrusive thoughts, under some circumstances, might aid recall of nonnegative events through temporary mood improvement or altered perspective (in the manner found by Rusting & DeHart, 2000; also see Parrott & Spackman, 2000). However, are these measures enough?

According to Teasdale et al. (2000) and others, approximately 80% of people diagnosed with major depressive disorder experience recurrent depressive epi-



sodes. Practical considerations therefore encourage us to consider not merely the opposition of habitual thinking by controlled procedures but the training of new habits through practice in control. Virtually the only line of research with that general aim is the research on mindfulness training, adapted from the meditation work of Kabat-Zinn by Teasdale, Williams, and Segal. The training consists of a sustained focus on some simple act (typically breathing). When attention wanders, the individual acknowledges the new thought or feeling but then re-directs attention to the simple act. It differs from simple thought suppression in two main respects: acknowledgment of the thought and practice in redirection. Do the benefits of such training extend to long-term habits of control? So far, Williams et al. (2000) have found that mindfulness training boosts the effects of cognitive-behavioral therapy in reducing overly general autobiographical memory by formerly depressed participants. Moreover, for people with at least three prior episodes of depression, the addition of mindfulness training to cognitive-behavioral therapy significantly reduced recurrence during the subsequent year (Teasdale et al., 2000). These studies, of course, are merely a beginning.

In short, the best antidote to maladaptive habits is a new set of habits—not the opposite sort of habits recommended by Pollyanna and the teachings of Norman Vincent Peale (1956) and not the habits of suppression as recommended by certain grandmothers but the habits of thought control. Cognitive control, as conceived by cognitive psychologists, is a concept that opposes habit, in that habitual procedures require little attention. But if the necessary control procedures—awareness of the wandering stream of thought and subsequent disengagement, for example—are practiced “religiously,” they too can become habitual. In the absence of mind wandering and rumination, memory biases are less extreme, and memory impairment is repaired.

### *Notes*

1. Induction procedures are particularly useful when it is difficult to determine the content of natural thought, although some procedures do not produce memorial effects that mimic patterns in natural depression. For a case in which they fail to show mood-congruent recall in the same study in which it was obtained for dysphoric students, see Kwiatkowski and Parkinson (1994; also see Eich & McCaulay, 2000; Perrig & Perrig, 1988).

Inductions have also been used to study mood-dependent memory: better memory when mood at initial encounter matches mood at test. Mood-dependent memory has also been studied with participants diagnosed with bipolar disorder. When the “mood” during initial encounter (mania or depression) matched the mood at test, higher levels of recall or recognition were found (Eich, Macaulay, & Lam, 1997; Weingartner, Miller, & Murphy, 1977). See Blaney (1986, p. 237) for a discussion of how mood-dependent memory can be seen as a special case of mood-congruent memory.

2. Ironically, overgeneral tendencies have also been correlated with spontaneous

intrusions of stressful memories (Brewin, Reynolds, & Tata, 1999; Wessel, Merckelbach, & Dekkers, 2002).

3. In one exception to the early rule, Elliott and Greene (1992) did show impaired word-stem completion and homophone spelling but omitted unprimed items on the test, which might have encouraged participants' awareness of the memorial goal and a concomitant use of memory as object. (See Bazin et al., 1994, and Roediger & McDermott, 1992, for full discussions of their design.)

4. Of course, attention might well be impaired during initial exposure. Consider a report by Rokke, Arnell, Koch, and Andrews (2002), who investigated the size of attentional blinks in a rapid-serial-visual-presentation paradigm (RSVP) administered to students with varying degrees of dysphoria. Moderately to severely dysphoric participants performed relatively well when the only task was to detect the presence of a single letter in the stream of rapidly presented letters. However, their performance suffered more, compared to that of nondysphoric or mildly dysphoric participants, when the task also involved attention to a letter occurring earlier in the stream (a deeper attentional blink). This outcome implicates fundamental deficits in redirecting attention.

5. Some of the results reported in this section should be viewed cautiously, given either unexpected differences on baseline trials (e.g., Joormann, in press) or lack of information about baseline (e.g., Bradley et al., 1997).

6. Studies using this directed forgetting paradigm have revealed interesting differences associated with clinical disorders. For example, Sonntag et al. (2003) have shown that schizophrenics fail to show effects of directed forgetting on measures of recollection (see chapter 7). McNally, Metzger, Lasko, Clancy, and Pitman (1998) found poor directed forgetting of trauma words by women with posttraumatic stress disorder, as well as deficits in remembering neutral and positive words on the lists to be remembered (see chapter 4).

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