

# Cognitive Behavior Therapy and Executive Functioning in Depression

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When considering psychological treatments for depression, a therapist needs to be aware of some of the wider cognitive and neuropsychological difficulties experienced by his or her patient in order to tailor therapy appropriately. The depressed person may display rigid and concrete thinking, attentional problems, a tendency to bias information negatively, and experience memory difficulties. In cognitive psychology or neuropsychological terms, many of the outlined difficulties are linked to deficits in executive functioning. Executive abilities are associated with frontal lobe processes and are concerned with problem-solving, motivational, self-regulatory abilities, and interpersonal skills. This article examines the role of executive deficits in depression and suggests ways in which therapy may be adapted to accommodate for these problems.

**Keywords:** working memory; frontal lobe; depression; psychotherapy; information processing

Within Safran and Segals's (1990) list of suitability factors associated with cognitive behavior therapy (CBT), it is stated that the therapy is most useful for those patients who can do the following: understand the CBT rationale, assess and work with thoughts and feelings, maintain attention and focus, and demonstrate good alliance potential. Performing these tasks places great demands on patients' executive abilities, which are related to frontal lobe functioning. However, mental health difficulties have been associated with reduced executive and frontal lobe functioning. This article examines the neuropsychological and cognitive aspects related to these features and outlines their relevance to clinical treatment of depression.

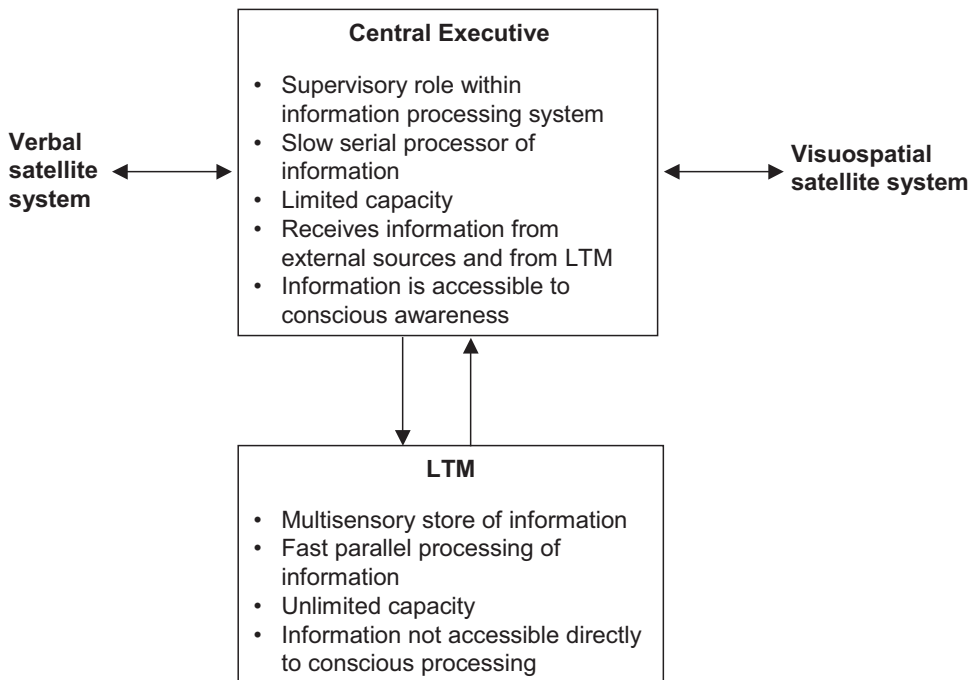
Executive functioning is closely associated with frontal area activities. The frontal lobes, situated in the anterior of the brain, govern many high-level intellectual processes including problem-solving skills, conscious processing, and abilities to sustain and shift attention. Damage

to this area may result in a deterioration of these processes but may also lead to changes in personality (disinhibition, irritability, egocentricity, loss of awareness and insight), behavioral problems (loss of initiative), and emotional disturbance (lability, anxiety, frustration, anger; Gazzaniga, Ivry, & Mangun, 2002).

In cognitive psychology, executive processing has also been associated with memory. Baddeley (1986) developed his working memory (WM) framework to explain experimental findings relating to short-term memory. WM represents a store for retaining and for performing mental operations on information over the short-term. A simplified version of the WM framework is presented in Figure 1. The diagram shows a central processor of information, the central executive, which is supported by a number of specialized satellite systems. The satellite systems assist with the temporary storage and coding of specific information. The integration of the material from all satellite systems occurs within the executive. There is neuropsychological evidence to support the WM model (Gazzaniga et al., 2002), and the frontal lobes appear to play an important, although not exclusive, role in its activities.

As Figure 1 denotes, the executive plays a supervisory role in the information-processing system, having the ability to direct conscious attention, process incoming stimuli, and retrieve relevant memories from long-term memory (LTM). However, its supervisory role comes at a price: The central executive is a relatively slow processor of information and may become inefficient when required to deal with a lot of information quickly.

A clinical example of overloading the executive is *excessive rumination*, a term that may be defined as the repetitive focusing on oneself and the nature and consequences of negative feelings (Watkins & Brown, 2002). It is relevant to note that in situations where there is an overloading of the supervisory system, one is likely to observe numerous information processing difficulties,



**FIGURE 1.** Working memory model and its relationship to long-term memory (LTM).  
 Source: Adapted from Baddeley (1986).

such as difficulties concentrating, focusing, and sustaining attention; poor retrieval and storage of information in the LTM; and problems initiating and guiding intentional behavior, as well as difficulties in shifting attention. As one can see, such difficulties are typical of the symptoms we associate with many clinical presentations, including generalized anxiety disorder, obsessive-compulsive disorder, and depression. However, in order to give the present article a specific focus, we have chosen to illustrate the issues using depression.

## STUDIES ON EXECUTIVE DEFICITS IN DEPRESSION

Evidence linking executive functioning to depression comes from psychometric studies and brain imaging techniques, including methodologies that monitor blood flow patterns within the brain (Drevets & Raichle, 1995). Gazzaniga et al. (2002) relate results from imaging to clinical symptoms:

*Depressed patients exhibit a profile of overactivity in prefrontal regions associated with working memory and in areas linked to the generation of affective memories. With these people, representations persist for a long time and are imbued with heightened affect. A situation that a normal person might find neutral, or at most mildly aggravating, becomes amplified and takes on onerous overtones. The depressed patient cannot let a situation go. (p. 566)*

A number of psychometric studies of depression (Lampe, Sitskoorn, & Heeren, 2004; Porter, Gallagher, Thompson, & Young, 2003; Watkins & Brown, 2002) have reported impairments on tests of executive functioning. For example, people with depression have displayed impairments on various tests of *abstraction ability* (Braff & Beck, 1974; Newman & Sweet, 1986; Shipley et al., 1981). James, Reichelt, Freeston, and Barton (2007) suggest that such deficits lead to overly concrete thinking, preventing depressed patients from appreciating underlying dynamics associated with events and interpersonal relationships. This may result in cognitive distortions and errors and patients developing erroneous views of themselves and their relationship with others.

Several studies have found evidence of *problem-solving impairment* on tests involving hypothesis testing, such as card-sorting tests, with patients displaying a loss of cognitive flexibility (e.g., Stordal et al., 2004). Depressed patients have also shown a greater tendency to persevere and commit significantly more commission errors (intrusions, interference, addition of inappropriate material) on problem-solving tests as compared to nondepressed people (Cornblatt, Lenzenweger, & Erlenmeyer-Kimling, 1989). This may lead to the depressed person becoming stuck in a negative ruminative cycle.

*Memory problems* are also common in depression. For example, depressed people showed impairment in short-term verbal and nonverbal/visuospatial memory and LTM (Cassens, Wolfe, & Zola, 1990) and sentence-repetition tasks (Kronfol, Hamsher, Digre, & Waziri, 1978). Hence, the person may have difficulties processing new and reevaluating old information, which may lead to a negative bias.

It is relevant to acknowledge that, to date, it is not evident whether the observed deficits are products or causes of the depression. Hence, we clearly need to be cautious about our theorizing. Despite the growing evidence of deficits in executive functioning in depression, the nature of the deficits has yet to be established. Watkins and Brown's (2002) study suggests that the problems are associated with capacity difficulties rather than functional changes. In their study they compared a group of depressed with nondepressed participants on a digit-generation task following rumination or distraction induction. During rumination induction, participants were asked to focus on their feelings and experiences; during distraction they focused on unrelated items. The researchers found a significant increase in ruminations in the depressed group compared to the nondepressed group following the rumination induction but not following the distraction induction. They concluded, therefore, that depressed people do not have a fundamental deficit in central executive functioning; rather, their reduced executive capacity is related to excessive rumination.

Such a finding suggests that improvements in mood could be obtained if therapy was targeted at helping depressed patients to organize their thinking better (e.g., in ways that reduced the load on the central executive). This might involve presenting information in simplified, paced ways, and providing the patient with a rationale that assists him or her to better organize the chaotic thinking commonly experienced in depression.

## CLINICAL DIFFICULTIES AND ADAPTATIONS

As highlighted previously, executive difficulties in depression have a wide-ranging impact on several aspects of the person's cognitive functioning. Recent evidence suggests that many depressed patients experience executive problems and those that do are less likely to benefit from treatments, including cognitive therapy (Alexopoulos, 2005). In relation to CBT, executive problems disrupt patients' abilities to learn new material, and thus they experience difficulties understanding the rationale underpinning the therapy.

The current authors believe that therapists need to be more aware of the nature of the cognitive difficulties commonly associated with affective disorders in order to adapt their therapy accordingly. Take for example the case of a patient exhibiting difficulties with *response inhibition*, thus being unable to inhibit unwanted stimuli such as dysfunctional cognitions. This may lead the patient to become trapped in a vicious cycle, unable to inhibit negative automatic thoughts (NATs). This cycle could be unwittingly reinforced if the therapist used assessment procedures that focused excessively on monitoring negative cognitions. In contrast, by adopting positive strategies (e.g., use of positive data logs) alongside the NAT monitoring procedures, patients may be able to break their vicious cycles of NATs.

In order to promote clinicians' awareness of executive functioning within our own teaching programs, the present authors regularly ask participants to generate some of the typical executive problems exhibited by people with depression. During an experiential exercise the participants are invited to write down the typical executive problems they have encountered when treating patients with depression (e.g., poor concentration and attention, memory and processing biases, problem-solving problems, self-absorption resulting in interpersonal difficulties). Participants then generate potential solutions to these difficulties. We often remind them of the evidence of hyperactivity within the frontal lobes, as a way of cueing them to the notion that techniques should generally be aimed at slowing patients' processing speed down, and conducting therapy in organized and concrete formats in order to reduce loads on patients' working memories. We have summarized the feedback from a number of these workshop exercises in Table 1. The left-hand column of Table 1 illustrates some of the executive problems a depressed person may experience and their consequences. The right-hand column presents the therapeutic strategies identified to overcome the difficulties.

Most of the strategies mentioned in Table 1 will be familiar to CBT therapists, possibly with the exception of the notion of scaffolding (Vygotski & Cole, 1978). This concept is borrowed from learning theory and basically involves assisting new understanding by providing structures (written or verbal material, cues, contexts, praise, facts) specifically designed to promote new learning (James, Allen, & Collerton, 2004). As new learning occurs, these supportive structures are removed (faded), and the scaffolding process begins again to promote learning at a higher level.

## IMPLICATIONS

The strategies highlighted in Table 1 are part of most cognitive-behavioral therapists' toolbox and can be found described in greater detail in textbooks and various CBT competence rating scales, such as the Cognitive Therapy Scale manual (Young & Beck, 1980) and the CTS-Revised

**TABLE 1. EXECUTIVE FEATURES IN DEPRESSION**

Executive Deficits and Their Consequences	Possible Responses in Therapy
<p>Poor concentration—leads to inability to maintain focus for prolonged periods of time. Hence, patient will find it difficult to fight against the current negative style of thinking. Note, negative automatic thoughts require little concentration, as they have become automatic. Negative information processing—leads to development of vicious circle of negative thinking about self, world, and future.</p>	<p>Reduce complexity of material, shorten session, only cover a few topics, use frequent feedback. Frequently check patient’s understanding of the material covered, and pace session according to patient’s needs. Use therapeutic breaks within session.</p> <p>Educate the patient about processing biases, as such awareness may help slow negative processes down, making them less automatic. Then commence cognitive reevaluation training. One way of doing this is to use the metaphor of a “fragile egg,” the idea that self-esteem requires nourishing and that it is nourished through a semipermeable external membrane. In depression, negative information is said to pass straight across the external membrane of the egg, while positive information either bounces straight off, or gets transformed into a negative form in order to pass through membrane. Hence, therapy tries to allow positive information to obtain access and to nourish patient’s self-esteem.</p>
<p>Poor attention abilities—leads to inability to direct and sustain focused attention. Additional problems with difficulties in shifting attention between different topics or concepts.</p>	<p>Ensure agenda is meaningful for patient, with a small number of items on the agenda. Provide feedback frequently and summarize and chunk relevant information. Elicit feedback. Use simple diagrams and use written materials to reinforce concepts, but avoid being abstract. Remove any environmental distractions (e.g., may need to close windows to prevent extraneous noises).</p>
<p>Memory problems—leads to working memory deficits, as well as encoding and retrieval problems. Retrieval biases are in favor of negative information. Autobiographical information is often overgeneralized, preventing the patient from remembering how he may have coped successfully in the past.</p>	<p>Prevent overloading of the patient’s working memory. Ensure that information is provided in a paced manner. Repeat main therapeutic concept frequently to help consolidate material and facilitate encoding. Avoid blaming the patient for inability to recall either positive events or coping strategies from the past, as this is a feature of their executive problems. Educate patient about the biases. Facilitate the generation of positive memories by recontextualizing the memories, involving the patient visualizing the target event and reinstating contextual features (sights, sounds, smells) present at original encoding.</p>

Poor problem solving—leads to inability to define difficulties, to determine appropriate goals, and to devise plans to meet one's goals. Memory problems mean that patients are often unable to reflect on how they have coped in similar situations in the past.

Reduce problems into component parts in order to simplify tasks. Use scaffolding techniques to provide support in order to help the patient generate potential answers. Until the patient can engage in a more collaborative approach, they may need a great deal of guidance. Use behavioral experiments to reenergize problem-solving skills. The experiments need to be set up sensitively, so even if the patient is unable to carry out activities, he or she will learn something about his or her depression from having attempted to engage in them. Keep tasks simple; it is important that the therapist acknowledges his/her role in the therapeutic problems (e.g. "The reason you had difficulties was because I didn't explain last week's homework task well").

Lack of motivation—leads to inability to fight the depression or to engage in effortful strategies to overcome behavioral inertia.

Ensure agenda and homework are meaningful for patient. Work with patient to predict obstacles. Reinforce therapeutic gains, no matter how small. Set meaningful goals that are achievable, measurable, monitored, and reviewed regularly. Explain the therapeutic rationale regarding treatment; such explanations will help to instill a realistic expectation regarding the course of treatment. For example, inform patient that initially his or her engagement in tasks is unlikely to make him or her feel better. Indeed, getting a sense of pleasure or mastery may take some time. Also, inform patients that by end of therapy they probably will experience negative automatic thoughts and occasionally low mood, but these will be at more manageable levels.

Lack of awareness of own executive problems—leads to the patient being overly critical of self, and comparing self negatively with "old/nondepressed" self.

Assist patients in obtaining some understanding of their difficulties. For example, use formal testing, or alternatively one can investigate the deficits via a discussion or checklist approach (e.g., Are you having problems concentrating? How long before your mind starts to wander?).

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manual (Blackburn, James, Milne, & Reichelt, 2001; James, Blackburn, & Reichelt, 2001). Despite these issues having been widely addressed in such literature, from the first author's experience of supervising and teaching trainees, it is evident that few trainees are fully aware of the importance of delivering therapy at a slow but engaging pace, using frequent and appropriate feedback, or using simple and short sentences. This point is well supported by research carried out by Nathan and colleagues (Nathan, Wilkinson, Stammers, & Low, 2001), who have shown that depressed patients' presentations may mimic those of patients with Alzheimer's disease.

However, even when trainees are aware of the need to conduct therapy in this manner, they require a lot of practice and patience in order to work in this rather laborious style. It is the present authors' shared view that trainers and supervisors bear a great deal of the responsibility in teaching these fundamental skills to their trainees. Indeed, we believe that it is ethically wrong and perhaps dangerous to train clinicians to use complex skills until they have been grounded in the basics (James, 2001). Hence, in our clinics, before a trainee sees a patient, we would expect that he or she has the ability to communicate to, and be understood by, a patient operating at the same level as someone with a mild dementia.

Given that some depressed patients' presentations can mimic organic difficulties, it is worth briefly examining the literature on CBT for organic brain disorders (i.e., dementia, stroke, and head injury; Teri & Gallagher-Thompson, 1991; Whitehouse, 1994) in relation to treatment strategies. From our review, the recommendations regarding the structure and process changes required in the treatment of organic presentations are broadly similar to those outlined in Table 1. However, there are some additional features not previously identified. For example, Whitehouse (1994) suggests that patient self-acceptance is a crucial feature within the therapeutic process. Recently, this issue has become more topical in the general CBT literature, yet it is noteworthy that the ability to self-examine without being critical has been an important aspect of treatment in the organic literature for some time. A further recommendation was the greater use of advocates and family members during the therapeutic work. Indeed, Teri and Gallagher-Thompson (1991) enlisted the support of family members to good effect in their successful CBT treatment of people with Alzheimer's disease. The role of the family members was to act as advocates both in and out of session and as memory facilitators. Both aspects are worth considering when working with severely depressed patients who display executive deficits.

## FUTURE DIRECTIONS

It is evident to us that prior to conducting further exploratory work in the area, clinicians, neurologists, and cognitive psychologists need to communicate more with each other. Indeed, they need to liaise and take stock of what is already known about the neurology and the cognitive psychology of executive functioning, working memory, and their links to mood. From such teamwork, we may begin to map out cognitive impairments specific to affective disorders and develop targeted psychometric testing to determine levels of deficits. Armed with such knowledge, it may be possible to better tailor our intervention strategies in line with patients' deficits. For example, if it was found that someone had poor attention abilities, our initial interventions could be aimed at improving attention. In contrast, if psychometric screening revealed memory biases, perhaps we could help the patient to develop specific mnemonic strategies aimed at retrieving positive, specific memories and previous coping strategies.

## CONCLUSION

With regard to executive difficulties experienced in depression, research has been able to highlight a range of deficits that might impair the patient's functioning. There is increasing evidence

from brain imaging and psychometric studies that, in terms of depression, overactivity in the frontal area of the brain and areas associated with working memory is linked to information processing problems. While neurological deficits are not usually made explicit to this extent in the formulation and treatment of depression, it has become clear that this information can be a useful addition to therapy. It can help guide the therapist, and allow him or her to focus on structural and process issues in CBT. Such adaptation could aid engagement and support patients with cognitive deficits. Future research should thus investigate the impact of tailoring therapy for people with executive deficits with regard to therapeutic outcome.

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