

# Use of Memory Reconsolidation in Psychotherapy and Suggestions for a Brain Imaging Study

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The recent discovery by brain scientists of the *reconsolidation* of memory circuits (see research bibliography below) overturned the almost century-old tenet that emotional learnings and acquired responses maintained in long-term implicit memory are indelible—unerasable and permanent for the lifetime of the individual. Reconsolidation, induced endogenously through behavioral procedures, has been shown by neuroscientists to actually eliminate a target implicit memory trace, rendering it impossible to reactivate, in sharp contrast with extinction, which merely suppresses conditioned responses without erasing them, allowing relatively easy reactivation.

The existence of reconsolidation appears to imply that the brain's built-in neurodynamics allow for true liberation from negative emotional learnings formed early in life. This would have revolutionary implications for psychotherapy. A safe, ethical, clinical process that reliably induces reconsolidation and selectively erases symptom-generating implicit memories, ending symptom production, would be a significant development.

A peer-reviewed article by Ecker and Toomey (2008) presented evidence of such a clinical process, named Coherence Therapy, and a more fully developed account of both reconsolidation research and its clinical application is the subject of a volume by Ecker, Ticic and Hulley (2012). The clinical observations involve the same markers of decisive change as neuroscientists use for verifying erasure through reconsolidation and ruling out extinction:

- An implicit emotional learning or schema that had been driving symptom production can no longer be re-evoked, even after decades of being easily reactivated into virulent expression.
- Effortless, lasting symptom cessation is an immediate result of schema depotentiation. Panic, depression, avoidance behaviors, and many other symptoms cease as soon as the emotional schema driving them becomes devoid of subjective realness and compelling quality.
- The well-defined clinical steps that produce this depotentiation correspond one-to-one to the steps identified by neuroscientists as bringing about reconsolidation.

Reconsolidation is the only known neural mechanism capable of dissolving an existing emotional learning. On that basis, Ecker, Ticic and Hulley (2012) propose that reconsolidation is the mechanism of change whenever the markers of change listed above are observed to result in any type of psychotherapy. They support that view by analyzing published case examples of four diverse therapies in which those markers are apparent, and they show that the steps of the process that induces reconsolidation and erasure are identifiable in each clinical account, though they were not identified by the authors of the case examples.

Coherence Therapy consists of precisely those steps, explicitly described. It appears to be the only system of psychotherapy with a methodology that explicitly matches the steps identified by researchers as being required by the brain for reconsolidation. Though it is too early to regard the methodology of Coherence Therapy as an empirically-based therapy, it is well situated to be understood and studied within a framework of empirical knowledge, owing to (a) many published clinical observations supporting its putative recruitment of reconsolidation, as noted above, and (b) Ecker and Toomey's (2008) detailed analysis of its probable neurological substrates, some of which should be detectable by brain imaging.

As described below, brain imaging could potentially corroborate the occurrence of reconsolidation in psychotherapy. The value of this kind of study was emphasized in a review article on the neurobiology of psychotherapy by neuroscientists Etkin, Pittenger, Polan and Kandel (2005), who concluded, “There is no longer any doubt that psychotherapy can result in detectable changes in the brain. . . . [S]everal lines of evidence point to an important role for neuroimaging. . . in following the success of therapeutic interventions. . . .”

Verifying the recruitment of reconsolidation in psychotherapy would be an historic development. Currently, among clinical outcome researchers there is widespread skepticism regarding the existence of any significant level of specific treatment effect in psychotherapy. This view is based on the 75-year history of randomized controlled trials measuring essentially the same level of efficacy across many different types of therapy. However, the discovery of reconsolidation changes the picture in a fundamental way, as Ecker, Ticic and Hulley (2012) describe. Any therapy that achieves reliable control of the reconsolidation process should demonstrate a specific treatment effect of significant magnitude, as well as a significantly higher level of psychotherapeutic efficacy.

## fMRI Study of Coherence Therapy: Specific Objectives

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The study envisioned would generate fMRI images at critical moments during therapy sessions in order to identify the neural substrate of specific, transient mental processes that putatively are crucial to psychological and behavioral change in Coherence Therapy. Images before therapy begins and after its completion would also be obtained.

Coherence Therapy follows a strategy of retrieving and then depotentiating the specific emotional schemas in implicit memory that are maintaining a given symptom or problem. These nonverbal schemas, completely unconscious at the start of therapy, emerge into awareness experientially. Their verbalization is a key part of bringing about their integration into conscious, neocortical knowledge. Once integrated, a retrieved schema is then subjected to a well-defined process of transformational unlearning and dissolution.

Each of those activities of retrieval and transformation is carried out in Coherence Therapy through a specialized, focused methodology, and each entails pivotal mental events that are readily identifiable at certain moments. For example:

- An implicit schema is reactivated and reveals its presence by producing a noticeable internal experience, such as an emotion, image, somatic sensation and/or a meaning-laden cognition, providing an initial point of access for further eliciting.
- The schema’s nonverbal, constituent knowledge structures (component constructs) emerge into conscious, right-hemispheric emotional experience and then are verbalized, creating concurrent left-hemispheric knowledge.
- The presenting symptom is recognized lucidly by the client to be part of an adaptive response launched by the now-conscious schema—a recognition of personal agency.
- An experience of disconfirmation causes depotentiation of the schema, presumably by recruiting reconsolidation of the implicit memory circuits that encode the schema.

A great deal stands to be learned, both clinically and neurologically, by obtaining fMRI images identifying the brain systems participating in those therapeutic events. Questions that could be answered include:

- What brain regions are responsible for generating a specific type of clinical symptom? Coherence Therapy's methods are highly selective in activating and manipulating the specific unconscious constructs maintaining a symptom, and so should be richly fruitful for correlating specific cognitive and emotional processes with brain regions.
- Are there brain regions that come into play whenever an existing schema is experienced concurrently with contradictory knowledge, creating a disconfirmation, whatever may be the content of the schema and the contradictory knowledge? These would be brain regions involved in implementing the reconsolidation process.
- Does subjective depotentiation of an emotional schema, with associated symptom cessation, correspond to immediate disappearance of some local brain activity?
- Treatment-specific effects may be identifiable through comparison of pre/post fMRI images with those already reported for cognitive-behavioral therapy. For example, as described by Toomey and Ecker (2009), "Brain imaging studies of the reduction of depression by SSRIs and by CBT show that those two types of treatment have quite different effects on over a dozen brain regions (Goldapple et al., 2004), yet the two treatments are known to have essentially equal efficacy in producing symptom relief (DeRubeis, Gelfand, Tang and Simons, 1999; Hollon et al., 1992). The post-CBT brain scans show regional effects that are consistent with the psychological model of counteractive change posited by CBT, lending support for that model. A corresponding study carried out for coherence therapy could indicate whether coherence therapy's models of symptom production and symptom cessation are likewise consistent with changes of brain activation resulting from coherence therapy. Distinct differences should be apparent between post-treatment brain scans of CBT and coherence therapy responders. For example, ...a hyperactive subgenual cingulate (Brodmann area 25) is a key characteristic of depressed persons (Mayberg et al., 1999). An important component of cortico-limbic pathways, this region has been shown to be a main neural correlate of the feeling of sadness (Liotti, Mayberg, Brannan, McGinnis, Jerabek and Fox, 2000). Curiously, CBT, even when effective in reducing depressive symptoms, does not diminish the activation of this region (Goldapple et al., 2004). We have conjectured an explanation based on coherence psychology: hyperactivation of area 25 may be caused by chronic activation of specific, unconscious, sadness-inducing personal constructs held in subcortical implicit memory. CBT by design does not access or depotentiate such deeply unconscious material, but we believe coherence therapy will prove to do precisely that, and would therefore yield post-therapy brain scans of responders that show diminished activity in area 25."

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