**EMDR, Neuroscience and Dreams**

**By Laura Rose**

**Neuroscience and EMDR**

**EMDR basics.** Eye Movement Desensitization and Reprocessing is a psychotherapeutic technique that was developed in the late 1980s by American psychologist and educator Francine Shapiro. She discovered that certain rapid shifts in eye movements had a mitigating effect on disturbing thoughts. She also noticed that later, when she recalled the initially troubling events, they did not seem as upsetting or as valid as they had been. Shapiro began to experiment with eye movement in her clinical practice, and after 2 years, she published her first paper on EMDR (Shapiro, 1989). EMDR is now the most researched treatment for PTSD and is endorsed by the American Psychiatric Association, the American Psychological Association, and the Veterans Administration.

EMDR is used extensively to reduce anxiety and posttraumatic stress symptoms such as intrusive thoughts, nightmares, and flashbacks. Although many studies have been conducted that confirm its efficacy in the treatment of traumatic symptoms, no conclusive evidence exists as to the particular healing mechanism of EMDR. A number of theories have been posited, mostly from the areas neuroscience and cognitive behavioral therapy, which are discussed further on. EMDR is also believed to be effective in the treatment of a variety of other clinical issues such as Depression, Generalized Anxiety Disorder, Substance Abuse and other addictions, Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD), grief, sleep disturbance, Obsessive Compulsive Disorder, phobias, dissociative disorders, low self-esteem, complex developmental trauma, and even physical pain (Shapiro, 2001). Though it is marketed for a laundry list of undesirable conditions, EMDR essentially addresses the trauma that is at the core of this myriad of pathological issues.

Shapiro (2001) asserted that pathology is “configured by the impact of earlier experiences that are held in the nervous system” (p. 14). She proposed that the information from the trauma is stored in the nervous system in the same way that it was perceived at the time of the original experience: due to a disruption in normal neural activity, the information is not processed and is therefore stored in the same maladaptive state in which it was perceived at the time of the trauma. Shapiro identified two ways in which EMDR functions. First, focusing on traumatic images and the associated negative cognitions, feelings, and body sensations, accompanied by some form of *bilateral brain stimulation*, diminishes or *desensitizes* the affective responses to the traumatic image. EMDR addresses the traumatic *memories* of the event that carry with them the residue of the disturbing feelings, thought, and sensations. The second way is through integrative *reprocessing*, whereby the disturbing memories are brought to an adaptive resolution. Through repeated sets of bilateral stimulation, the maladaptive traumatic memories are properly processed, which allows for the creation of new *memory networks*, or associated systems of information.

**Bilateral stimulation.** Bilateral stimulation techniques are aimed at restoring balance between the left and right hemispheres of the brain, thereby facilitating the body’s natural information-processing system (Shapiro, 2001). Current practices of EMDR incorporate various methods of bilateral stimulation: eye movements, alternating sounds between right and left ear, and alternating taps either between right and left knee or right and left hands. This thesis focuses on the method of *saccadic*eye movements (rapid eye movements between fixed points), because from my observation and the reports of colleagues and clients with similar experiences, visual stimulation produced more vivid imagery than the other forms of bilateral stimulation. During the course of my research, this observation was supported by findings showing that the saccadic eye movements of EMDR simulate REM sleep states (Kuiken et al., 2010; Stickgold, 2002).

**EMDR: The Traditional Eight-Phase Treatment Process**

The traditional model of EMDR treatment described below was demonstrated in EMDR training with Rick Levinson in Austin, Texas, in March, 2011. Although it is often regarded as a *technique*, EMDR is, in fact, a comprehensive therapeutic approach and treatment modality. Textbook EMDR is an eight-phase treatment process, with the first three phases occurring prior to beginning treatment: phase one, obtaining a thorough client history; phase two, preparing the client with information and the availability of a *safe place* to which the client can return should he or she become overwhelmed by memories or images during the sessions; and phase three, assessing which of the client’s target memories or disturbances should be addressed first. Phases four through seven comprise the implementation of the technique.

Phase four, the desensitization phase, utilizes eye movements or other bilateral brain stimulation to desensitize the emotional charge that is produced by the traumatic memory—emotions which are enveloped in associated images, sounds, smells, and other sensory information. These *target memories* are identified and addressed individually. Often, new targets arise during phase four, which are noted and addressed in subsequent sessions. Once there is little to no emotional activation surrounding the identified targets, phase five, the installation phase, may begin.

During phase five, clients are asked to verify the preferred positive cognition they would like to hold about themselves in association with the original incident. The belief is that by using the same process of bilateral eye movement sets, the positive cognition is installed and incorporated into a new neural memory network. Once clients express the validity of the positive cognition the treatment continues to phase six.

Phase six is the body scan. Clients are asked to report any body sensations that indicate residual disturbance. If negative sensations are reported, then the bilateral stimulation is continued, while clients focus on the sensations. Sets are repeated until all body disturbance disappears. Often, during this phase, insight is gained as to additional experiences that need to be processed.

Phase seven is the closure portion of the session. Whether processing has been completed or not, it is important that clients leave in an undisturbed emotional state. Breathing and relaxation techniques or other meditation exercises can be used to reground clients in their bodies. Sometimes containment exercises, which allow the room to act as a safe container for any remaining material that may need to be processed, are necessary to allow clients to know that they do not have to take the material from the session with them. Clients are also debriefed as to what they might experience between sessions. Phase eight is the re-evaluation that begins each subsequent EMDR session to check if the previous target needs additional processing or determine if new targets need to be addressed.

**The Use of Imagery in Phase Four of EMDR Treatment**

The phase of EMDR treatment addressed in this thesis is phase four: desensitization and reprocessing. The use of imagery during this phase is a good introduction for clients for working with symbolic material and working metaphorically with the content of their stories and with the source of their symptoms. During this phase, I have incorporated work with active imagination.

Although phase five, the installation phase, is valuable, the purpose of this thesis is to show how EMDR can facilitate active imagination and thus deepen an exploration of the unconscious. As will be discussed in Chapter III, when working with clients, I am not concerned with having the client incorporate *positive beliefs—*at least not so overtly, and not at this stage in the treatment process. I am interested, however, in using EMDR to develop internal resources for clients whose ego strength is deficient to the point of needing to develop a schema in which they recognize the qualities they possess, which will allow them to work further with imaginative activity. This use of EMDR—called *resource installation*—is a helpful step in helping a client to build self-trust, which, as previously discussed, is critical for doing active imagination.

When processing traumatic experiences, EMDR acts to engage the senses, which are intricately connected with the painful emotions that are evoked when reminded of the traumatic event. Shapiro (2001) observed that

Language that delineates specific emotion is too limiting to express the full range of affective experience. This is one reason that the emphasis in EMDR is placed on body sensations rather than on language. Its emphasis on affect also underscores the relationship between EMDR and the experiential therapies. (p. 30)

In addition to somatic experiencing, this phase is built around cognitive behavioral interventions, which engage the objective *rational* faculties that were not present during the traumatic event. In the desensitization phase of the treatment, the client is asked to recount the original incident vividly. The client is then asked to come up with an image that best represents the original incident. When working with an emotion or negative self-belief resulting from a trauma the source of which is unknown or difficult to locate, the client and therapist work to find the earliest memory of having experienced the emotion or negative feelings. It is not important that the image is *objectively* true or accurate; in fact, the client can invent an image that is a representation of that event or a culmination of related events, as long as the image activates the neural memory networks of associated emotions, sensations, and beliefs being processed.

The client is then asked to express the words that go best with the image that represents the client’s negative self-belief, establishing the current *negative cognition* that is associated with the original incident. Next is to identify a *positive cognition* that the client would prefer to believe in relation to the image of the incident. The client assesses his or her *validity of cognition* (VoC), whereby, on a scale of 1 to 7—1 being completely false and 7 being completely true—the client rates how true the positive cognition feels in that moment. The primary purpose of using a scale is to give the client and therapist a baseline by which to gauge the progress of the treatment and to engage the client’s prefrontal cortex—the rational, information-processing area of the brain.

After the positive cognition is established, the client is asked to pair the negative cognition with the target image to gain deeper access to the stored traumatic memory (Shapiro, 2002, p. 36). The client is asked to rate on a scale of 0 to 10, where 0 is neutral or no disturbance and 10 is the highest imaginable, how disturbing the event is now. This measure is the subjective unit of disturbance scale, or SUDS. Finally, the client is asked to identify the specific emotions and body sensations that are experienced when the original incident is brought up and to notice where in the body the sensations are felt. The client thus brings into awareness, as much as possible, the various aspects of the body and mind impacted by the trauma. These sensations and emotions may never have been consciously recognized during times of *reliving* the traumatic experience, for reasons that will are discussed in a subsequent section.

The client is directed to focus simultaneously on the image and the associated emotions and physical sensations in order to activate the neural memory networks while the first set of eye movements begins but to then allow “whatever wants to come up to come up.” The therapist begins a series of eye movements—longer sets of stimulation are used if trying to get the client to process more deeply. At the end of each set, the therapist asks the client to take a deep breath and to let it go and briefly relate what they experience now. “These instructions give clients the opportunity to self-administer their exposure to the material [and] maintain mastery over the disturbing emotional target” (Shapiro, 2002, p. 38). It is important for clients not to speak too much during the set breaks, because becoming too involved in the story will reduce the activation of the neural networks and interrupt the state-dependent processing. This interruption defeats the goal which, according to Shapiro, is “to focus directly on the information as it is *currently* stored” (p. 38), in the aroused state. Clients often report a combination of feelings, thoughts, other memories, or physical body sensations. In my personal experience with clients, drawing on Jung’s (1921/1971) theory of typology, the nature of the responses gives me insight into the client’s superior (more conscious) and inferior (more unconscious) functions.

After the brief feedback is given, the client is told to “go with that” or to “notice that.” During this portion of the EMDR sets, the therapist can use his or her skill, experience, and relationship with the client to determine the best way to redirect the client’s attention at the onset of each subsequent set. An aspect of free association of imagery occurs during the phase four process; however, the client is periodically guided back to the original incident in order to remain connected with it, though the representative image may have changed.

Phase four sets are continued until it is apparent that the client is no longer experiencing disturbance in association with the accessed material. Only at this point is the SUDS checked again, and if the client reports a 1 or a 0, proceeding to phase five is indicated. As noted earlier, it is likely that new channels of associated memories will surface; these target images should be processed until all channels associated with the experience are neutralized.

**Studies Relating EMDR, REM Sleep, and Dreaming**

**Early studies.** Some research on the phenomenon of the dream reveals a connection between neuroscience and imaginal psychology. In 1989, Shapiro hypothesized a connection between the saccadic eye movements of EMDR and REM processing during sleep. Although she did not indicate the specific mechanisms of the relationship, she offered a rudimentary appraisal of a reciprocal relationship between eye movements and negative affective states: eye movements decrease stress, and increased stress impedes eye movement. Since this discovery, a number of studies, sometimes building upon one another, have endeavored to conduct a more discerning and detailed analyses of the link between EMDR and the eye movements related to dreaming.

As early as 1995, Ricky Greenwald, clinical psychologist and expert in the treatment of trauma, suggested that EMDR corresponds to dreaming and dreamwork. In the article he published at the time, “Eye Movement Desensitization and Reprocessing (EMDR): A New Kind of Dreamwork?” Greenwald spoke to the sequential processing aspect of EMDR, whereby “one memory segment seems to lead to the next in a manner that progressively produces healing and growth” (p. 53). The role of the therapist, as in dreamwork or active imagination, is to track and sometimes to guide the client, but in the least obtrusive way possible, so as to not interfere in the client’s process. Greenwald suggested that this allows the client to summon internal symbolic resources in the EMDR process “with which to master the material, in a manner reminiscent of dreamwork” (p. 52).

The following year, clinical psychologist Alan Hassard (1996) proposed a possible correlation between EMDR and dreams based on the *reverse learning* theory of REM sleep. Underpinning this theory was the idea that “in neural networks, since information is distributed as patterns of activity in the network, different memories can be superimposed on each other at the same or related places” (p. 278). The associations made during traumatic experiences produce faulty or irrational memory networks that are not rational and, in some way, must be un-learned. Hassard expounded upon on the previous hypothesis that the function of REM sleep is to “reorganize or classify information in the brain to enhance efficiency of neurological functioning” (p. 120). Hassard (1996) believed that traumatic memories become “too embedded electrophysiologically to respond to the reverse learning process in REM. The effectiveness of EMDR may be that induced eye movements recreate the reverse learning conditions normally present in REM sleep” (p. 120). This was one of several theories indicating the superiority of EMDR over REM sleep in the healing process.

**More recent studies.** Some of the most referenced studies in the field of trauma research are those that were conducted by Robert Stickgold. In a 2002 study, Stickgold gave a more detailed account of how EMDR utilizes the same processes as REM sleep. Through brain imaging studies, he observed that REM sleep and PTSD share pathways in the brain, which lends further evidence to the concept that “traumatic memories are reprocessed during REM sleep and the hypothesis that PTSD may alter the normal function of the brain during REM sleep” (p. 70), which would account for nightmares and flashbacks experienced by PTSD sufferers.

***Bilateral stimulation and cortical integration of memories***. If the lasting effects of trauma are due in large part to improperly processed memories, then a crucial aspect for healing trauma is to provide the conditions necessary to process those memories. Stickgold (2002) purported that EMDR’s distinct benefits are due to its ability to activate the sleep-dependent memory processing that trauma effectively breaks down. His hypothesis did not revolve around eye movements alone; due to a culmination of findings, he believed that bilateral stimulation, in general, “forces the subject to constantly shift her attention across the midline. It is this orienting response that we propose induces a REM-like state, facilitating the cortical integration of memories” (p. 71) into general semantic networks. This integration can reduce the impact of the (explicit) traumatic memories mediated in the hippocampus and the associated negative affects processed by the amygdala (implicit memories).

In addition to his finding that EMDR produces the REM-like state present in dreaming, that is necessary for processing traumatic memories, Stickgold (2002) made an important observation about one of the advantages of EMDR over REM dream states:

Unlike REM sleep, when frontal lobe activity is largely inhibited (Hobson et al., 1998), during EMDR treatment the patient can choose the material to hold in mind at the start of the bilateral stimulation, and thereby bias the information that will be processed. Although the selection of associations is largely automatic and unintentional, holding a specific image in mind at the start of the stimulation assures that the associations, however weak and tangential, will most likely be related to the original image. (p. 72)

Here, Stickgold indicated a fundamental difference between EMDR and free association. Like Jung, he saw the importance in going back to the original representative image and holding it as the focal point to give context to all other associations. Jung (1916/1969) made a similar distinction between free association and active imagination in his essay on the transcendent function. He cautioned about the potential for active imagination to be ineffective, “since it easily passes over into the so-called ‘free association’ of Freud, whereupon the patient gets caught in the sterile circle of his own complexes, from which he is in any case unable to escape” (p. 68). By not developing the awareness of the original material, a greater chance exists that the meaning derived from the associations will be influenced by external factors and not from the contents of the original image. “The kind of understanding with which we are concerned at this stage consists in a reconstruction of the meaning that seems to be immanent in the original ‘chance’ idea” (p. 87).

Like a dream, EMDR intensifies the unconscious material and spontaneous images and associations occur, but like active imagination, EMDR engages more ego consciousness in the process than free association or dreamwork, and thus one has more control over what material is to be explored. Jung (1916/1969) concluded, “If the conscious attitude were only to a slight degree ‘directed’ the unconscious could flow in quite of its own accord” (p. 158). In my experience, EMDR sits somewhere between the process of dreaming and the function of active imagination and, as such, is a suitable mixture of the conscious and the unconscious that Jung described.

***EMDR and attentional shifts within dream imagery***. Other studies have explored more direct links between EMDR and imagination. Donald Kuiken and his colleagues conducted a vast amount of research on the phenomenology of dreams. Kuiken led two studies, reported in the article, “Eye Movement Desensitization Reprocessing Facilitates Attentional Orienting” (Kuiken et al., 2001-2002), specifically focusing on EMDR and its potential connection to dream states and imaginal activity. Kuiken shared Stickgold’s (2002) interest in the orienting response phenomenon that occurs during the rapid eye movements of dreams. Kuiken’s focus, though, was not on the processing of unresolved memories, but rather on a different implication of the orienting response: the spontaneous transformations in dream content. He reasoned that this occurrence might explain the correlation between Shapiro’s (1989) reports that EMDR created sudden shifts in the details of traumatic memories, beliefs, and emotions and corresponding evidence that “the phasic events of REM sleep prompt spontaneous shifts in scenes, characters, and emotions within dream imagery” (Kuiken et al., 2001-2002, p. 6). He concluded that perhaps the connection between the transformations produced by EMDR and the transformations during dreams is that rapid eye movements transform the revisualization of traumatic events by the same spontaneous attentional shifts—the orienting response—that occur during dreaming. Important to his hypothesis was evidence from other research that metaphoric dream formation occurs through intersection of typically distinct thought categories during these attentional shifts (p. 6). Kuiken’s findings in this study showed that the EMs of EMDR do facilitate attentional and semantic elasticity, promoting a broader, more metaphorical understanding of their trauma.

The present findings suggest that, when such metaphoric references emerge during revisualization, the eye movements may also facilitate the client’s readiness to capture, hold, and explore their connotations. For example, a revisualized moment in which an assailant grasps a victim’s hand may spontaneously evoke recollection of a nightmare about “a spider on my hands.” The emergent image of the spider may become a metaphoric vehicle for comprehending a traumatic topic, i.e., the assailant’s grasp. Whereas attentional inflexibility may normally terminate attempts to comprehend the significance of this metaphor, the eye movements of EMDR may enable continued exploration of its import. (p. 15)

This capability of EMDR would seem to make possible further explorations in active imagination, especially for those whose capacity or will to engage in metaphoric thought is lacking. In this way, EMDR can serve to help *deliteralize* (Hillman, 1989, p. 145) the rote representations of the trauma. Without attentional flexibility, one has more resistance to seeing things in a way that is unfamiliar. Attentional flexibility, Kuiken believed, may activate the mechanism that inhibits fear and the avoidance associated with the fear (Kuiken et al., 2001-2002, p. 6). Avoidance is an obstacle in any therapeutic work, including engaging in active imagination; this is another way that EMDR can complement imaginal and depth work in the therapeutic process.

Applied to EMDR, Kuiken’s findings suggested that “rapid eye movements facilitate shifts in the contents of working memory that become metaphoric vehicles for exploring the felt meaning of a traumatic narrative, perhaps contributing to its affective complexity and coherence (Kuiken et al., 2001-2002, p. 15). In a later study in 2010 (Kuiken et al., 2010), Kuiken furthered the exploration into the implications of metaphoric emergence during EMDR and dreaming. He hypothesized that “rapid bilateral EMs activate the orienting response and by doing so, attenuate emotion and facilitate the emergence of figurative, especially metaphoric meanings” (p. 243). Beyond the understanding that EMDR and REM sleep generate metaphoric activity and create a deeper understanding of the trauma, he wanted to see the impact that this phenomenon had on emotions or affective states of trauma. The study found that EM manipulation countered dissociation, a byproduct of trauma, by facilitating interest in metaphoric sentences. The implications of this finding are important for both, EMDR and imaginal psychology. This is yet another avenue that illuminates the healing function of imaginal activity. The ability to think metaphorically is essential in active imagination and other imaginal activity that promotes the deliteralization of symptoms and a more poetic interpretation of the experience. The visualization during the imaginative process, including EMDR, “occupies a space that is neither strictly inner nor outer, revealing the way in which mind constructs the world, only to cut through to a transcendent truth” (Kirmayer, 2006, p. 597).

***Resolving trauma***.Further research of the literature on the topic of trauma and healing revealed that the two fields of neuroscience and imaginal psychology seem to dance around the same material, separated only by their seemingly polarized perspectives. In its quest for causal explanation, “observational and experimental methods of science have shown how the exercise of the faculties of imagination can have healing efficacy (Kirmayer, 2006, p. 592). A multitude of literature about imaginal approaches to healing often makes similar observations and draws similar conclusions as neuroscientists do regarding this topic, but the research is simply couched in different terminology.

Unfortunately, the effective chasm that is often created between neuroscience and depth psychology because of such diverse languages creates barriers and limitations for both. Van der Kolk (2011, lecture), borrowing mostly from the Stickgold (2002) studies, related that “trauma work is a lot like dream work; the dreams role in resolving trauma is allowing dream imagery to finish processing in the thalamus. EMDR brings the thalamus back to life.” Van der Kolk’s (2011) vision into the healing process was that once the thalamus processes the imagery, it can then integrate the information into an associative memory network in a way that will allow for future experiences to be contextualized based on the new information. He recognized that dream imagery can be symbolic of symptomatic residue of trauma but did not, however, discuss the value of the dream imagery itself. He indicated that the dream’s job is complete once it has facilitated the completion of the necessary physiological process that was interrupted. He did not question the value of consciously exploring dream imagery in a way that integrates it in daily life by continuing to allow dreams and images to live metaphorically in consciousness awareness.

Mario Mancia (2006b), as a psychoanalyst and neuroscientist, had the rare advantage of a more global perspective in the field of psychology. He made the observation that each discipline can learn from the other and noted,

It is obvious that the various neuroscientific approaches to dreaming tell us nothing of the meaning of the dreams or their role in the economy of the mind. Psychoanalysis is the only discipline that is interested in dreams for what they reveal about the unconscious, and as a function of the mind able to symbolically transform presymbolic experiences and to create images without recollection to fill the gap of the nonrepresentations of the early repressed unconscious. (p. 17)

Mancia’s assessment illustrates his awareness of the dream as an essential tool by which to activate the unconscious mind, and he demonstrated equal awareness of the physiological limitations that can impact psychic processes. Mancia (2006a) instructed that “patients with damaged limbic structures cannot distinguish between dreams and reality and may live in a continuous dream-like existence” (p. 320). This is valuable information for depth therapists who incorporate imaginal into their work with their clients. Jung (1916/1969) was clear that a basic prerequisite for active imagination is the client’s ability to distinguish between outer reality and inner fantasy. He proposed that equal voice must be given to the conscious and unconscious mind to gain insight in to the process of the transcendent function (p. 75). This threshold between conscious and unconscious is where blending the worlds of neuroscience and imaginal psychology can foster deeper clinical work with clients. One of the arts of psychotherapy is being cognizant and compassionate regarding the clients’ limitations, and with simultaneous persistence, helping them to allow the contents of their dreams and imagination toinvite them to a deeper connection with their psychic lives.

**References**

Greenwald, R. (1995). Eye movement desensitization and reprocessing (EMDR): A new kind of dreamwork? *Dreaming*, *5*(1), 51-55.

Hassard, A. (1996). Reverse learning and the physiological basis of eye movement desensitization. *Medical Hypothoses, 47*(4), 277-282. doi:10.1016/S0306-9877(96)90067-5

Hillman, J. (1989). *A blue fire* (T. Moore, Ed.). New York, NY: HarperCollins.

Hillman, J. (2009). *James Hillman: Jung and active imagination* [DVD]. Pacifica Graduate Institute. Available from http://www.depthvideo.com/store/

Jung, C. G. (1969). The transcendent function. In H. Read et al. (Eds.), The collected works of C. G. Jung (R. F. C. Hull, Trans.) (2nd ed., Vol. 8, pp. 67-91). Princeton, NJ: Princeton University Press. (Original work published 1916)

Jung, C. G. (1971). Psychological types: Definitions. In H. Read et al. (Eds.), *The collected works of C. G. Jung* (2nd ed., Vol. 6. pp. 408-486). Princeton, NJ: Princeton University Press. (Original work published 1921)

Kirmayer, L. J. (2006). Toward a medicine of the imagination. *New Literary History, 37*(3), 583-601.

Kuiken, D., Bears, M., Miall, D., & Smith, L. (2001-2002). Eye movement desensitization reprocessing facilitates attentional orienting. *Imagination, Cognition and Personality*, *21*(1), 3-20.

Kuiken, D., Chudleigh, M., & Racher, D. (2010). Bilateral eye movements, attentional flexibility and metaphor comprehension: The substrate of REM dreaming? *Dreaming*, *20*(4), 227-247.

Mancia, M. (2006a). The dream in the dialogue between psychoanalysis and neuroscience. In M. Mancia (Ed.), *Psychoanalysis and neuroscience* (pp. 305-326). Milan, Italy: Springer.

Mancia, M. (2006b). Introduction: How the neurosciences can contribute to psychoanalysis. In M. Mancia (Ed.), *Psychoanalysis and neuroscience* (pp. 1-32). Milan, Italy: Springer.

Shapiro, F. (1989). Efficacy of the eye movement desensitization procedure in the treatment of traumatic memories. *Journal of Traumatic Stress*, *2*(2), 199-223. doi:10.1002/jts.2490020207

Shapiro, F. (2001). *Eye movement desensitization and reprocessing (EMDR): Basic principles, protocols, and procedures*. New York, NY: Guilford Press.

Stickgold, R. (2002). EMDR: A putative neurobiological mechanism of action. *Journal of Clinical Psychology*, *58*(1), 61-75. doi:10.1002/jclp.1129

van der Kolk, B. A. (2011). Trauma, memory, and the restoration of one’s self. Lecture presented at The Esalen Institute, Big Sur, CA.