

EMDR

Francine Shapiro, Ph.D.
 P.O. Box 51010 • Pacific Grove, CA 93950
 • (831) 372-3900 * Fax (831) 647-9881

The following review of commonly asked questions and suggested research parameters is an appendix written by Louise Maxfield which appears in F. Shapiro (Ed.) *EMDR as an Integrative Psychotherapy Approach: Experts of Diverse Orientations Explore the Paradigm Prism* published by American Psychological Association Press.

What is EMDR?

Eye Movement Desensitization and Reprocessing (EMDR) is a psychotherapy treatment that was originally designed to alleviate the distress associated with traumatic memories (Shapiro, 1989a, 1989b). Shapiro's (2001) Adaptive Information Processing model posits that EMDR facilitates the accessing and processing of disturbing memories to bring these to an adaptive resolution. After successful treatment with EMDR, affective distress is relieved, negative beliefs are reformulated, and physiological arousal is reduced. During EMDR the client attends to emotionally disturbing material in brief sequential doses while simultaneously focusing on an external stimulus. Therapist directed lateral eye movements are the most commonly used external stimulus but a variety of other stimuli including hand-tapping and audio stimulation are often used (Shapiro, 1991). Shapiro (1995) hypothesizes that EMDR facilitates the accessing of the traumatic memory network, so that information processing is enhanced, with new associations forged between the traumatic memory and more adaptive memories or information. These new associations are thought to result in complete information processing, new learning, elimination of emotional distress, and development of cognitive insights. EMDR uses a three pronged protocol: (1) the past events that have laid the groundwork for dysfunction are processed, forging new associative links with adaptive information; (2) the current circumstances that elicit distress are targeted, and internal and external triggers are desensitized; (3) imaginal templates of future events are incorporated, to assist the client in acquiring the skills needed for adaptive functioning.

What is the theoretical basis for EMDR?

Shapiro (1995) developed the Accelerated Information Processing model to describe and predict EMDR's effect. More recently, Shapiro (2001) expanded this into the Adaptive Information Processing (AIP) model to broaden its applicability. She hypothesizes that humans have an inherent information processing system that generally processes the multiple elements of experiences to an adaptive state, where learning takes place. She conceptualizes memory as being stored in linked networks that are organized around the earliest related event, and its associated affect. Memory networks are understood to contain related thoughts, images, emotions, and sensations. The AIP model hypothesizes that if the information related to a distressing or traumatic experience is not fully processed, the initial perceptions, emotions, and distorted thoughts will be stored as they were experienced at the time of the event. Shapiro argues that such unprocessed experiences become the basis of current dysfunctional reactions, and are the cause of many mental disorders. She proposes that EMDR successfully alleviates mental disorders by processing the components of the distressing memory. These effects are thought to occur when the targeted memory is linked with other more adaptive information. When this occurs, learning takes place, and the experience is stored with appropriate emotions, able to guide the person in the future.

Suggested Research. Research is needed to test predictions made by the AIP model. The hypothesis that treating etiological events will resolve core pathology could be evaluated with outcome measures evaluating personality, interpersonal qualities, affect control, and sense of identity. The

hypothesis that EMDR enhances information processing can be tested by process research evaluating the in session elicitation of new material, and determining if and how this new material predicts resolution of the targeted memories.

Is EMDR a one-session cure?

No. When Shapiro (1989a) first introduced EMDR into the professional literature, she included the following caveat: "It must be emphasized that the EMD procedure, as presented here, serves to desensitize the anxiety related to traumatic memories, not to eliminate all PTSD-symptomology and complications, nor to provide coping strategies to victims" (p 221). In this first study, the focus was on one memory, with effects measured by changes in the Subjective Units of Disturbance (SUD) scale. The literature consistently reports similar effects for EMDR with SUD measures of in-session anxiety. Since that time, EMDR has evolved into an integrative approach that addresses the full clinical picture. Two studies (Lee, Gavriel, Drummond, Richards, & Greenwald, in press; Rothbaum, 1997) have indicated an elimination of diagnosis of posttraumatic stress disorder (PTSD) in 83-90% of civilian participants after four to seven sessions. Other studies using participants with PTSD (e.g. Ironson, Freund, Strauss, & Williams, 2002; Scheck, Schaeffer, & Gillette, 1998; S. A. Wilson, Becker, & Tinker, 1995) have found significant decreases in a wide range of symptoms after three-four sessions. The only study (Carlson, Chemtob, Rusnak, Hedlund, & Muraoka, 1998) of combat veterans to address the multiple traumas of this population reported that 12 sessions of treatment resulted in a 77% elimination of PTSD. Clients with multiple traumas and/or complex histories of childhood abuse, neglect, and poor attachment may require more extensive therapy, including substantial preparatory work in phase two of EMDR (Korn & Leeds, 2002; Maxfield & Hyer, 2002; Shapiro, 2001).

Suggested research. It is recommended that outcome studies compare EMDR to other PTSD treatments using the complete three pronged protocol (described above) and 12 or more sessions, with a session by session evaluation of recovery patterns. A wide range of psychometrics should be used to evaluate the process of change in overt symptoms, quality of life, and personal development parameters. An evaluation of client factors, such as trauma history, should be analyzed to determine their possible effect on treatment length and course.

Is EMDR an efficacious treatment for PTSD?

Yes. EMDR is the most researched psychotherapeutic treatment for PTSD. Twenty controlled outcome studies have investigated the efficacy of EMDR in PTSD treatment. Sixteen of these have been published, and the preliminary findings of four have been presented at conferences. Studies using waitlist controls found EMDR superior; six studies compared EMDR to treatments such as biofeedback relaxation (Carlson et al., 1998), active listening (Scheck et al., 1997), standard care (group therapy) in a VA hospital (Boudewyns & Hyer, 1996), and standard care (various forms of individual therapy) in a Kaiser HMO facility (Marcus, Marquis, & Sakai, 1997). These studies all found EMDR superior to the control condition on measures of posttraumatic stress.

Seven randomized clinical trials have compared EMDR to exposure therapies (Ironson et al., 2001; McFarlane, 2000; Rothbaum, 2001; Thordarson et al., 2001; Vaughan et al., 1994) and to cognitive therapies plus exposure (Lee et al., 1997; Power, McGoldrick, & Brown, 2001). These studies have found EMDR and the cognitive/behavioral (CBT) control to be relatively equivalent, with a superiority in two studies for EMDR on measures of PTSD intrusive symptoms, and for CBT in the study by Taylor, Thordarson, and colleagues (Thordarson et al., 2001) on PTSD symptoms of intrusion and avoidance. There were two controlled studies without randomization; one (Deville & Spence, 1999) found the CBT condition superior to EMDR and the other (Sprang, 2001) found EMDR superior to the CBT control on multiple measures.

Two studies found EMDR to be more efficient than the CBT control condition, with EMDR using fewer treatment sessions to achieve effects (Ironson et al., 2002; Power et al., 2001). Two studies that compared treatment response on a session-by-session basis (Thordarson et al., 2001) and at mid-point (Rothbaum, 2001), reported that EMDR did not result in more rapid treatment effects than exposure.

However, in both these studies the exposure treatment sessions were supplemented with one hour of daily homework, while the EMDR condition was implemented without homework. The only study to control for the ancillary effects of homework (Ironson et al., 2002) supplemented both exposure and EMDR treatments with the same number of hours of exposure homework (see above). Most studies noted that because EMDR has minimal homework requirements the overall treatment time was much shorter for EMDR (e.g., Lee et al., in press; Vaughan et al., 1994). Treatment effects have generally been well maintained (see below).

The efficacy of EMDR in the treatment of PTSD is now well recognized. In 1998, independent reviewers (Chambless et al., 1998) for the APA Division of Clinical Psychology placed EMDR, exposure therapy, and stress inoculation therapy on a list of empirically supported treatments, as "probably efficacious"; no other therapies for any form of PTSD were judged to be empirically supported by controlled research. In 2000, after the examination of additional published controlled studies, the treatment guidelines of the International Society for Traumatic Stress Studies gave EMDR an A/B rating (Chemtob, Tolin, van der Kolk, & Pitman, 2000) and EMDR was found efficacious for PTSD. The United Kingdom Department of Health (2001) has also listed EMDR as an efficacious treatment for PTSD.

Foa, Riggs, Massie, and Yarczower (1995) suggested that exposure therapy may not be very effective with clients whose prominent affect is anger, guilt, or shame. Reports by clinicians treating combat veterans (e.g., Lipke, 1999; Silver & Rogers, 2002) indicate that EMDR may be effective with such PTSD presentations. A preliminary study found that EMDR reduced symptoms of guilt in combat-related PTSD (Cerone, 2000). Taylor, Thordarson, and colleagues (Thordarson et al., 2001) reported equivalent and significant effects for exposure therapy and EMDR on reducing symptoms of anger and guilt.

Suggested research. Although EMDR and CBT treatments are relatively equivalent in the treatment of PTSD symptoms, comparisons of both clinical and client factors are recommended. This includes the comprehensive evaluation of clinical factors such as length of treatment, attrition, maintenance, and generalization of effects, and the assessment of client factors such as symptom severity, affective presentation, comorbid disorders, and the presence of complex PTSD. Additional research in actual field settings are suggested to increase external validity. Specific attention should be paid to the client compliance (Scott & Stradling, 1998) and the effects of various treatments on the therapists (see Marks et al., 1998). It is also recommended that a wide range of psychometrics evaluating more than simple symptom reduction be included.

Are treatment effects maintained over time?

Twelve studies with PTSD populations assessed treatment maintenance by analyzing differences in outcome between post-treatment and follow-up. Follow-up times have varied and include periods of 3, 4, 9, 15 months, and 5 years after treatment. Treatment effects were maintained in eight of the nine studies with civilian participants; one study (Devilley & Spence, 1999) reported a trend for deterioration. Of the three studies with combat veteran participants only one (Carlson et al., 1998) provided a full course of treatment (12 sessions). This study found that treatment effects were maintained at 9 months. The other two studies provided limited treatment: Devilly, Spence and Rapee (1998) provided two sessions and moderate effects at post-test were not maintained at follow-up. Pitman et al. (1996) treated only two of multiple traumatic memories, and treatment effects were not maintained at 5 year follow-up (Macklin et al., 2000). It appears that the provision of limited treatment may be inadequate to fully treat the disorder, resulting in remission of the partial effects originally achieved.

Suggested research. Future research should investigate whether any client factor (e.g., symptom severity, affective presentation, comorbid disorders, complex PTSD) predicts sustained effects. An assessment of treatment factors (e.g., length of preparation, length of treatment, treatment compliance, treatment response, symptom reduction) would also assist in the evaluation of the maintenance of effects. It is further recommended that studies use longer follow-up periods to better ascertain the long-term effects of treatment.

Is EMDR effective in the treatment of phobias, panic disorder, or agoraphobia?

There is much anecdotal information that EMDR is effective in the treatment of specific phobias. Unfortunately, the research that has investigated EMDR treatment of phobias, panic disorder, and agoraphobia has failed to find strong empirical support for such applications. Although these results are due in part to methodological limitations in the various studies, it is also possible that EMDR may not be consistently effective with these disorders. De Jongh, Ten Broeke, and Renssen (1999) suggest that since EMDR is a treatment for distressing memories and related pathologies, it may be most effective in treating anxiety disorders which follow a traumatic experience (e.g., dog phobia after a dog bite), and less effective for those of unknown onset (e.g., snake phobia).

There have been several randomized clinical trials assessing EMDR treatment of spider phobia (Muris & Merckelbach, 1997; Muris, Merckelbach, van Haften, & Nayer, 1997; Muris, Merckelbach, Holdrinet, & Sijsehaar, 1998). These studies indicated that EMDR was less effective than in vivo exposure therapy in eliminating the phobia. Methodological limitations of these studies include failure to use the full EMDR treatment protocol (see Shapiro, 1999) and confounding of effects, by using the exposure treatment protocol as the post-treatment assessment. When the full EMDR phobia protocol was used in case studies with medical and dental phobias (De Jongh et al., 1999; De Jongh, van den Oord, & Ten Broeke, in press), good results were achieved.

Clinical utility is an important consideration in treatment selection. The application of in vivo exposure may be impractical for clinicians who do not have easy access to feared objects (e.g., spiders) in their office settings; some phobias are limited to specific events (e.g., thunderstorms) or places (e.g., bridges). EMDR may be a more practical treatment than in vivo exposure, and the in vivo aspect can often be added as homework (De Jongh et al., 1999).

There have been three studies that investigated EMDR treatment of panic disorder with/out agoraphobia. The first two studies were preliminary (Feske & Goldstein, 1997; Goldstein & Feske, 1994) and provided a short course (six sessions) of treatment for panic disorder. The results were promising, but limited by the short course of treatment. Feske and Goldstein write, "Even 10 to 16 sessions of the most powerful treatments rarely result in a normalization of panic symptoms, especially when these are complicated by agoraphobia" (p. 1034). The EMDR effects were generally maintained at follow-up. A third study (Goldstein et al., 2000) was conducted to assess the benefits of a longer treatment course. This study however changed the target population and treated agoraphobic patients. Participants suffering from Panic Disorder with Agoraphobia did not respond well to EMDR. Goldstein (quoted in Shapiro, 2001) suggests that these participants needed more extensive preparation, than was provided in the study to develop anxiety tolerance. The authors suggest that EMDR may not be as effective as CBT in the treatment of panic disorder with/out agoraphobia; however no direct comparison studies have yet been conducted.

Suggested research. Studies are needed to make direct comparisons of EMDR and CBT in the treatment of panic disorder with/out agoraphobia. It is recommended that randomized clinical trials evaluate EMDR's efficacy in the treatment of traumatic phobias. Future studies could determine if there are any phobia populations for which EMDR treatment is inappropriate. The possibility that a combination of EMDR and in vivo exposure together may be more effective than either alone, should be investigated, with regards to outcome, efficiency, and attrition. In the treatment of agoraphobia, future research could examine the utility of developing anxiety tolerance prior to EMDR treatment. Appropriate fidelity should be assessed to include procedural adherence and the incorporation of the full phobia protocol (Shapiro, 2001).

Is EMDR applied to every clinical disorder?

No. EMDR was developed as a treatment for traumatic memories and research has demonstrated its effectiveness in the treatment of PTSD (see above). Shapiro (2001) states that it should be helpful in reducing or eliminating other disorders that originate following a distressing experience. For example, Brown, McGoldrick, and Buchanan (1997) found successful remission in five of seven consecutive cases of Body Dysmorphic Disorder cases after 1-3 EMDR sessions that processed the etiological memory. Similarly there have been reports of elimination of phantom limb pain following EMDR treatment of the etiological memory and the pain sensations (Vanderlaan, 2000; Wilensky, 2000; S. A. Wilson, Tinker, Becker, Hofmann, & Cole, 2000). It is not anticipated that EMDR will be able to alleviate symptoms arising from physiologically based disorders, such as schizophrenia or bipolar disorder. However, there are anecdotal reports of persons with such disorders being treated successfully with EMDR for distress related to traumatic events.

In addition to studies assessing the effectiveness of EMDR in the treatment of PTSD, phobias, and panic disorders (see above), some preliminary investigations have indicated that EMDR might be helpful with other disorders. These include dissociative disorders (e.g. Fine & Berkowitz, 2001; Lazrove & Fine, 1996; Paulsen, 1995); performance anxiety (Foster & Lendl, 1996; Maxfield & Melnyk, 2000); body dysmorphic disorder (Brown et al., 1997); pain disorder (Grant & Threlfo, in press; Ray & Zbik, 2002); and personality disorders (e.g., Korn & Leeds, in press; Manfield, 1998). These findings are preliminary and further research is required before any conclusions can be drawn. In [the text edited by F. Shapiro (Ed.) *EMDR as an Integrative Psychotherapy Approach: Experts of Diverse Orientations Explore the Paradigm Prism*] applications of EMDR are described for complaints such as depression (Shapiro), attachment disorder (Siegel), social phobia (Smyth), anger dyscontrol (Young), generalized anxiety disorder (Lazarus), distress related to infertility (Bohart), body image disturbance (Brown), marital discord (Kaslow), and existential angst (Krystal); all such applications should be considered in need of controlled research for comprehensive examination.

Suggested research. It is recommended that research evaluate the effectiveness of the standard EMDR protocol with such clinical complaints, prior to, or in addition to, testing any modification of the protocol. This will determine whether or not adjustments in preparation, targets, or process are useful.

Can EMDR's effects be attributed to placebo or non-specific effects?

No. A number of studies have found EMDR superior in outcome to placebo treatments, and to treatments not specifically validated for PTSD. EMDR has outperformed active listening (Scheck et al., 1998), standard outpatient care consisting of individual cognitive, psychodynamic, or behavioural therapy in a Kaiser Permanente Hospital (Marcus et al., 1997), relaxation training with biofeedback (Carlson et al., 1998). EMDR has been found to be relatively equivalent to CBT therapies in seven randomized clinical trials that compared the two approaches. Because the treatment effects are large and clinically meaningful, it can be concluded that EMDR is not a placebo treatment. For example, in a meta-analysis of PTSD treatments, Van Etten and Taylor (1998), calculated the mean effect sizes on self-report measures for placebo and control conditions as 0.43, for EMDR as 1.24, and for CBT as 1.27 (p. 135). Several studies (e.g., Thordarson et al., 2001) have measured the credibility of the treatments being provided, as a way to determine if EMDR elicited more confidence from clients, thereby producing larger effects; no study found EMDR more or less credible. Because EMDR is not more credible than these other therapies, it appears that the effects cannot be attributed to suggestion or a heightened placebo effect.

Suggested research. Assessments of credibility should be standard practice in all treatment outcome studies.

What have meta-analyses revealed about EMDR?

There have been three meta-analyses that evaluated EMDR outcomes. Van Etten and Taylor (1998) examined responses to psychotherapeutic and pharmacological treatments of PTSD. They reported that EMDR and exposure therapies achieved similar outcomes, and were superior to other psychotherapeutic treatments. In their analysis they noted that the EMDR studies had used fewer sessions (4.3) to achieve the same level of results produced by more exposure sessions (10.4). They concluded that their results "suggest that EMDR is effective for PTSD, and that it is more efficient than other treatments" (p. 140). However, direct comparisons of efficiency are better made within a single study with the same population, by analysis of session-to-session response.

The Davidson and Parker (2001) meta-analysis evaluated outcomes in 34 different EMDR studies. This was a thorough and comprehensive meta-analysis, although some studies were overlooked. They concluded that EMDR was superior to no-treatment and non-specific treatment controls, and equivalent in outcome to exposure and cognitive behavioural therapies. As reported previously in this Appendix, such findings are consistent with those in the EMDR literature. Unfortunately in their investigation of the eye movement component, Davidson and Parker did not distinguish between clinical dismantling studies and component action studies (see below). In addition, they did not distinguish between analogue studies which used partial EMDR done for 15 minutes with normal students and dismantling studies with multiple sessions for persons with chronic PTSD. This lack of distinction created large variability in the meta-analysis, and made it difficult to find effects. However, they noted that their data indicated that the comparison effect size between EMDR-with-EMS and EMDR-without-EMs, was "marginally significant if one examines only clinical populations satisfying [DSM] diagnostic criteria" (p. 311). Even this evaluation, however, failed to evaluate whether the length of treatment offered to the various PTSD populations was clinically adequate to reveal differential main effects.

There is much variability in the outcomes of EMDR studies, with a range of outcomes reported, and with the efficacy of EMDR varying across studies. In a meta-analysis (Maxfield & Hyer, 2002), we sought to determine if differences in outcome were related to methodological differences. We reviewed all published PTSD treatment outcome studies to identify methodological strengths and weaknesses and rated these using the Gold Standard (GS) Scale (adapted from Foa & Meadows, 1997). Then we examined the relationship between methodological rigor and effect sizes in these studies. Results indicated a significant relationship between scores on the GS Scale and effect size, with more rigorous studies reporting larger effect sizes. It appeared that methodological rigor removes noise and thereby decreases error measurement, allowing for the more accurate detection of true treatment effects. It should be noted that the association between methodology and outcome is purely correlational, and may actually be the effect of some unknown third variable. However, it can be argued that, when considering the aggregate evidence for the efficacy of EMDR, greater weight may be given to those studies with better methodology as these appear more likely to reveal accurate outcomes.

Suggested research. Future research can use meta-analyses to assess potential predictors of treatment outcome. Factors that could be examined include number of sessions, client characteristics, chronicity and severity of symptoms, type of diagnosis, and comorbidity. A meta-analysis of the eye movement component research is needed that will address the different types of research to determine if there is a differential outcome according to study type. This might assist in developing a more complete understanding of the role of dual attention in EMDR.

Is fidelity to treatment important?

Yes. Treatment fidelity is considered one of the gold standards of clinical research (Foa & Meadows, 1997). Clearly, if the treatment being tested does not adhere to the standard protocol, then the treatment being examined is not the standard treatment; the study will have poor validity and the results may not be informative about the actual treatment. Treatment fidelity has been a subject of much controversy (Greenwald, 1996; Perkins & Rouanzoin, 2002; Rosen, 1999). There is evidence that EMDR is a robust treatment, not affected by some changes to protocol; for example, variations in the eye

movement or stimulus component do not appear to interfere with outcome (Renfrey & Spates, 1994). On the other hand, there is evidence that truncating the procedure may result in poor outcomes; for example, an analysis (Shapiro, 1999) of the procedures used in the EMDR phobia studies found that those omitting more than half of the EMDR phases, achieved poor outcomes compared to those using the full protocol. In a methodological meta-analysis, we (Maxfield & Hyer, 2002) found a significant positive correlation between pre-post effect size and assessments of fidelity. Specifically those studies with fidelity that was assessed as adequate, tended to have larger effects than those with fidelity that was assessed as variable or poor, or not assessed.

Suggested research. A measure of treatment fidelity needs to be developed with good inter-rater reliability. Then the relationship between ratings on this measure and ratings of treatment effect can be specifically examined. Further, scores can be developed for the integrity of treatment received by each client, and this variable can be entered into analyses to determine the extent to which fidelity contributed to treatment outcome.

What elements of EMDR contribute to its effectiveness?

EMDR is a complex therapeutic approach that integrates elements of many traditional psychological orientations and combines these in structured protocols. These include psychodynamic (Fensterheim, 1996; Solomon & Neborsky, 2001; Wachtel, 2002), cognitive behavioural (Smyth & Poole, 2002; Wolpe, 1990; Young, Zangwill, & Behary, 2002), experiential (e.g., Bohart & Greenberg, 2002), physiological (Siegel, 2002; van der Kolk, 2002), and interactional therapies (Kaslow, Nurse, & Thompson, 2002). Consequently EMDR contains many effective components, all of which are thought to contribute to treatment outcome.

Marks, Lovell, Noshirvani, Livanou, & Thrasher (1998) propose that emotion can be conceptualised as a "skein of responses," viewed as "loosely linked reactions of many physiological, behavioural, and cognitive kinds" (p. 324). They suggest that different types of treatment will weaken different strands within the skein of responses and that "some treatments may act on several strands simultaneously" (p. 324). EMDR is a multi-component approach that works with strands of imagery, cognition, affect, somatic sensation, and related memories. This complexity makes it difficult to isolate and measure the contribution of any single component, especially as different clients with the same diagnosis may respond differently to different elements.

Shapiro's (2001) AIP model conceptualizes EMDR as working directly with cognitive, affective, and somatic components of memory to forge new associative links with more adaptive material. A number of treatment elements are formulated to enhance the processing and assimilation needed for adaptive resolution. These include: (1) Linking of memory components. The client's simultaneous focus on the image of the event, the associated negative belief, and the attendant physical sensations, may serve to forge initial connections among various elements of the traumatic memory, thus initiating information processing. (2) Mindfulness. Mindfulness is encouraged by instructing clients to "just notice" and to "let whatever happens, happen." This cultivation of a stabilized observer stance in EMDR appears similar to processes advocated by Teasdale (1999) as facilitating emotional processing. (3) Free association. During processing, clients are asked to report on any new insights, associations, emotions, sensations, images, that emerge into consciousness. This non-directive free association method may create associative links between the original targeted trauma and other related experiences and information, thus contributing to processing of the traumatic material (see Rogers & Silver, 2002). (4) Repeated access and dismissal of traumatic imagery. The brief exposures of EMDR provide clients with repeated practice in controlling and dismissing disturbing internal stimuli. This may provide clients with a sense of mastery, contributing to treatment effects by increasing their ability to reduce or manage negative interpretations and ruminations. (5) Eye movements and other dual attention stimuli. There are many theories about how and why eye movements may contribute to information processing, and these are discussed in detail below.

Suggested research. In order to determine the contribution of the relevant components, it is recommended that future dismantling studies employ more rigorous methodology (Maxfield & Hyer, 2002), a sample large enough to provide adequate power, and control conditions that are distinct from eye movements and theoretically meaningful. To date, no randomized clinical dismantling study has provided a full course of treatment to a large sample of clinically diagnosed subjects.

Is EMDR an exposure therapy?

A standard treatment for anxiety disorders involves exposing clients to anxiety eliciting stimuli. It has sometimes been assumed that EMDR uses exposure in this traditional manner and that this accounts for EMDR's effectiveness. Some reviewers have stated, "Had EMDR been put forth simply as another variant of extant treatments, we suspect that much of the controversy over its efficacy and mechanisms of action could have been avoided" (Lohr, Lilienfeld, Tolin, & Herbert, 1999, p. 201). However such a perspective ignores important elements of the EMDR procedure that are antithetical to exposure theories; in other words, the theories predict that if these EMDR elements were used in exposure therapy, a diminished outcome would result (Rogers & Silver, 2002). These elements include frequent brief exposures, interrupted exposure, and free association. (1) Exposure theorists Foa and McNally (1996) write: "Because habituation is a gradual process, it is assumed that exposure must be prolonged to be effective. Prolonged exposure produces better outcome than does brief exposure, regardless of diagnosis" (p. 334). EMDR however uses extremely brief repeated exposures (i.e., 20-50 seconds). (2) Other theorists (Marks et al., 1998) state that exposure should be continual and uninterrupted: "Continuous stimulation in neurons and immune and endocrine cells tends to dampen responses, and intermittent stimulation tends to increase them" (p. 324). EMDR, on the other hand, interrupts the internal attention repeatedly to ask "What do you get now?" (3) Exposure therapy is structured to inhibit avoidance (Lyons & Keane, 1989), and specifically prohibits the patient from reducing "his anxiety by changing the scene or moving it ahead quickly in time to skim over the most traumatic point" (p. 146) in order to achieve extinction of the anxiety. However, free association to whatever enters the person's consciousness is an integral part of the EMDR process.

Certainly theories explicating exposure therapy fail to explain the treatment effects of EMDR, with its brief, interrupted exposures, and its elicitation of free association. In addition there appears to be a difference in treatment process. During exposure therapy clients generally experience long periods of high anxiety (Foa & McNally, 1996), while EMDR clients generally experience rapid reductions in SUD levels early in the session (Rogers et al., 1999). This difference suggests the possibility that EMDR's use of repeated short focused attention may invoke a different mechanism of action than that of exposure therapy with its continual long exposure.

Suggested research. Research is needed to examine the role of exposure in the treatment of PTSD. This could be done by comparing standard EMDR to a modified EMDR protocol in which the amount of exposure was pre-determined. Likewise, standard exposure therapy could be compared to a variant in which exposure is interrupted using an EMDR-type procedure in which free association is elicited. Such research will be helpful in identifying some of the core mechanisms that are active in PTSD treatment. Physiological measures taken during each condition (see D. Wilson, Silver, Covi, & Foster, 1996) can reveal potential fruitful information regarding the physiological mechanisms of action and response during the process of change.

Are eye movements considered essential to EMDR?

Although eye movements are often considered its most distinctive element, EMDR is not a simple procedure dominated by the use of eye movements. It is a complex psychotherapy, containing numerous components that are considered to contribute to treatment effects. Eye movements are used to engage the client's attention to an external stimulus, while the client is simultaneously focusing on internal distressing material. Shapiro describes eye movements as "dual attention stimuli," to identify the process in which the client attends to both external and internal stimuli. Therapist directed eye movements are the most commonly used dual attention stimulus but a variety of other stimuli including

tactile and auditory stimulation are often used. The use of such alternate stimuli has been an integral part of the EMDR protocol for more than 10 years (Shapiro 1991, 1993).

Suggested research. All the outcome research in EMDR treatment has used eye movements as the dual attention stimulus. It is recommended that clinical dismantling studies investigate whether there is a difference in effect between EMs and the other dual attention stimuli, such as tactile stimulation and tones, and to determine if certain kinds of dual attention stimuli are more helpful for some types of clients than others. Other aspects of dual attention stimuli such as speed, intensity, and bilaterality also need to be studied. It is important that component studies have sample sizes sufficient to ensure adequate statistical power.

What has research determined about EMDR's eye movement component?

In 1989, Francine Shapiro (1995) noticed that the emotional distress accompanying disturbing thoughts disappeared as her eyes moved spontaneously and rapidly. She began experimenting with this effect and determined that when others moved their eyes, their distressing emotions also dissipated. She conducted a case study (1989b) and controlled study (1989a), and her hypothesis that eye movements (EMs) were related to desensitization of traumatic memories was supported. The role of eye movement had been previously documented in connection to cognitive processing mechanisms. A series of systematic experiments (Antrobus, 1973; Antrobus, Antrobus, & Singer, 1964) revealed that spontaneous EMs were associated with unpleasant emotions and cognitive changes.

There have been 20 published studies that investigated the role of EMs in EMDR. Studies have typically compared EMDR-with-EMs to a control condition in which the EM component was modified (e.g., EMDR-with-eyes-focused-and-unmoving). There have been four different types of studies: (1) case studies, (2) dismantling studies using clinical participants (3) dismantling studies using nonclinical analogue participants, and (4) component action studies in which eye movements are examined in isolation.

Case studies. Four case studies evaluated the effects of adding EMs to the treatment process, and three demonstrated an effect for EMs. Montgomery and Ayllon (1994) found eye movements to be necessary for EMDR treatment effects in five of six civilian PTSD patients. They wrote that the addition of the eye movement component "resulted in the significant decreases in self-reports of distress previously addressed. These findings are reflected by decreases in psycho-physiological arousal" (Montgomery & Ayllon, 1994, p. 228). Lohr, Tolin, and Kleinknecht (1995) reported that "the addition of the eye movement component appeared to have a distinct effect in reducing the level of [SUD] ratings" (p. 149). When Lohr, Tolin and Kleinknecht (1996) treated two claustrophobic subjects, substantial changes in disturbance ratings were achieved only after EMs were added to an imagery exposure procedure that used the brief frequent exposures of EMDR. The fourth study (Acierno, Tremont, Last, & Montgomery, 1994) did not use standard EMDR protocol for phobias, nor the standard procedures for accessing the image, formulating the negative belief, or eliciting new associations. In addition, the client was instructed to relax between sets of EMs until the SUD rating was reduced to baseline, a procedure not used in EMDR. The procedures used in this study did not eliminate the phobia and no effect was found for the EM condition.

Clinical dismantling studies with diagnosed participants. There have been four controlled dismantling studies with PTSD participants, and two studies where participants were diagnosed with other anxiety disorders. These studies have tended to show that EMDR-with-EMs was slightly better than EMDR-with-modification; however such comparisons have not usually been statistically significant, and results are equivocal. For example, Devilly et al. (1998) reported rates of reliable change of 67% for the EM condition, compared to 42% of the non-EM condition; Renfrey and Spates (1994) reported a decrease in PTSD diagnosis of 85% for EM conditions and 57% for the non-EM group. These studies unfortunately are limited by severe methodological problems, including inadequate statistical power. For example, there were six or seven persons per condition in the Renfrey and Spates (1994) PTSD study. The participants in the other three PTSD (Boudeywns & Hyer, 1996; Devilly et al., 1998; Pitman et al., 1996) studies were combat veterans, who received only three sessions or treatment of only two traumatic

memories. Such an inadequate course of treatment produced only moderate effect sizes; therefore a large sample would be required to provide adequate statistical power for the detection of any possible differences between groups. There has yet to be a single rigorous dismantling study with a sample adequate to assess treatment effects.

Clinical dismantling studies with analogue participants. The controlled studies that used analogue participants with nonclinical anxiety found no effect for EMs. There are many problems with these analogue studies, which typically used normal college student participants. The EMDR protocol was often truncated (e.g., Carrigan & Levis, 1999; Sanderson & Carpenter, 1992), resulting in poor construct validity and making interpretation of results problematic. It is also unlikely that the responses of analogue participants can be generalized to persons with chronic PTSD, a disorder that appears resistant to placebo effects (Solomon, Gerrity, & Muff, 1992; Van Etten & Taylor, 1998). Analogue participants responded well to EMDR-without-EMs, a procedure which contains a number of active components. The minimal distress of the analogue participants was relieved with minimal treatment, and the assessment of differences between the EM and nonEM conditions was limited by a floor effect. Consequently it may not have been possible to detect differences between conditions.

Component action studies. Component action studies test EMs in isolation. These studies typically provide brief sets of EMs (not EMDR) to examine their effects on memory, affect, cognition, or physiology. The purpose is to investigate the effects of moving the eyes (not EMDR), and EMs are compared to control conditions such as imaging and tapping. For example, a participant might be asked to visualize a memory image, then to move their eyes for a brief period, and then to rate the vividness of the image. This permits a pure test of the specific effects of EMs and non-EMs without the added effects of the active ingredients of the other EMDR procedures. The studies have generally used nonclinical participants and a within-subject design, that compares the differences in each individual's responses to the various conditions. This reduces the variance of subjective responding, and eliminates possible floor effects.

Findings from these studies suggest that EMs may have an effect on physiology, decreasing arousal (e.g., Barrowcliff, MacCulloch, & Gray, 2001; D. Wilson et al., 1996) and on memory processes, enhancing semantic recall (Christman & Garvey, 2000). Four studies (Andrade, Kavanagh, & Baddeley, 1997; Kavanagh, Freese, Andrade, & May, 2001; Sharpley et al., 1996; van den Hout, Muris, Salemink, & Kindt, 2001) have demonstrated that EMs decrease the vividness of memory images and the associated emotion. No (or minimal) effect has been found for tapping conditions. These studies suggest that EMs may make a contribution to treatment by decreasing the salience of the memory and its associated affect. (See discussion below on mechanisms of action).

Do eye movements contribute to outcome in EMDR? Much confusion tends to result when the results of the three types of component studies (see above) are combined. Because these studies differ substantially in design, purpose, participants, and outcome measures, they have produced a wide range of results: (1) In dismantling studies with analogue participants, EMs do not contribute to outcome, possibly because of a floor effect. (2) In clinical dismantling studies with diagnosed participants, there has been a consistent nonsignificant trend for a treatment effect. (3) In the component action studies a consistent significant effect for EMs in isolation was found in reducing the vividness of, and affect associated with, autobiographical memories; it is possible that such effects may contribute to treatment outcome. In the Davidson and Parker (2001) meta-analysis, no effects were found for EMDR-with-EMs compared to EMDR-without-EMs, when all types of studies were included. However, when the results of the clinical dismantling studies were examined, EMDR-with-EMs was significantly superior to EMDR-without-EMs.

Various reviews of the related EM research have provided a range of conclusions. Some reviewers (e.g., Lohr, Lilienfeld, Tolin, & Herbert, 1999; Lohr, Tolin, & Lilienfeld, 1998) stated that there is no compelling evidence that eye movements contribute to outcome in EMDR treatment and the lack of unequivocal findings has led some reviewers to dismiss EMs altogether (e.g., McNally, 1999). Other reviewers (e.g., Chemtob et al., 2000; Feske, 1998; Perkins & Rouanzoin, 2002) identified methodological failings (e.g., lack of statistical power, floor effects) and called for more rigorous study.

Suggested research. Research is needed to answer questions about the role of EMs and other dual attention stimuli. It is recommended that clinical dismantling studies use a large sample of participants with PTSD (from a single trauma) to investigate whether EMDR-with-EMs is more effective than EMDR-without-dual attention stimuli. To date, no study like this has been conducted. (See Shapiro, 2001, for specific recommendations for research designs.)

What are some hypothesized mechanisms of action for eye movements in EMDR?

A commonly proposed hypothesis is that dual attention stimulation elicits an orienting response. The orienting response is a natural response of interest and attention that is elicited when attention is drawn to a new stimulus. There are three different models for conceptualizing the role of the orienting response in EMDR: cognitive/information processing (Andrade et al., 1997; Lipke, 1999), neurobiological (Bergmann, 2000; Servan-Schreiber, 2000; Stickgold, 2002) and behavioral (Armstrong & Vaughan, 1994; MacCulloch & Feldman, 1996). These models are not exclusive; to some extent, they view the same phenomenon from different perspectives. Barrowcliff et al. (2001) posit that the orienting in EMDR is actually an "investigatory reflex," that results in a basic relaxation response, upon determination that there is no threat; this relaxation contributes to outcome through a process of reciprocal inhibition. Others suggest that the inauguration of an orienting response may disrupt the traumatic memory network, interrupting previous associations to negative emotions, and allowing for the integration of new information. It is further possible that the orienting response induces neurobiological mechanisms, which facilitate the activation of episodic memories and their integration into cortical semantic memory (Stickgold, 2002). All this is purely speculative, and research is needed to test these hypotheses.

There are several research studies (e.g., Andrade et al., 1997; Kavanaugh et al., 2001; van den Hout et al., 2001) indicating that EMs and other stimuli have an effect on perceptions of the targeted memory, decreasing image vividness and associated affect. Two possible mechanisms have been proposed to explain how this effect may contribute to EMDR treatment. Kavanaugh et al. (2001) hypothesize that this effect occurs when EMs disrupt working memory, decreasing vividness, and that this results in decreased emotionality. They further suggest that this effect may contribute to treatment as a "response aid for imaginal exposure" (p. 278), by titrating exposure for those clients who are distressed by memory images and/or affect. Van den Hout et al. (2001) hypothesize that EMs change the somatic perceptions accompanying retrieval, leading to decreased affect, and therefore decreasing vividness. They propose that that this effect "may be to temporarily assist patients in recollecting memories that may otherwise appear to be unbearable" (p. 129). This explanation has many similarities to reciprocal inhibition.

Suggested research. Research investigating mechanisms of action should be driven by hypotheses, with outcomes evaluated in relation to the hypothesis being tested. (See Shapiro 2001, for examples of suggested research designs.)

References

- Acierno, R., Tremont, G., Last, C., & Montgomery, D. (1994). Tripartite assessment of the efficacy of eye-movement desensitization in a multi-phobic patient. *Journal of Anxiety Disorders, 8*, 259-276.
- Andrade, J., Kavanagh, D., & Baddeley, A. (1997). Eye-movements and visual imagery: a working memory approach to the treatment of post-traumatic stress disorder. *British Journal of Clinical Psychology, 36*, 209-223.
- Antrobus, J. S., Antrobus, J. S., & Singer, J. L. (1964). Eye movements accompanying daydreaming, visual imagery, and thought suppression. *Journal of Abnormal and Social Psychology, 69*, 244-252.
- Armstrong, M. S., & Vaughan, K. (1996). An orienting response model of eye movement desensitization. *Journal of Behavior Therapy and Experimental Psychiatry, 27*, 21-32.
- Barrowcliff, A. L., MacCulloch, M. J., & Gray, N. S. (2001, May). *The de-arousal model of eye movement desensitization and reprocessing (EMDR), Part III: Psychophysiological and psychological concomitants of change in the treatment of posttraumatic stress disorder (PTSD) and their relation to the EMDR protocol*. Paper presented at the the EMDR Europe 2nd Annual Meeting, London, UK.
- Bergmann, U. (2000). Further thoughts on the neurobiology of EMDR: The role of the cerebellum in accelerated information processing. *Traumatology, 6* (3).
- Bohart, A. C., & Greenberg, L. S. (2002). EMDR And experiential psychotherapy. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, D.C.: American Psychological Association Press.
- Boudewyns, P. A., & Hyer, L. A. (1996). Eye movement desensitization and reprocessing (EMDR) as treatment for post-traumatic stress disorder (PTSD). *Clinical Psychology and Psychotherapy, 3*, 185-195.
- Brown, K. W., McGoldrick, T., & Buchanan, R. (1997). Body dysmorphic disorder: Seven cases treated with eye movement desensitization and reprocessing. *Behavioural & Cognitive Psychotherapy, 25*, 203-207.
- Brown, L. S. (2002). Feminist therapy and EMDR: A practice meets a theory. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, D.C.: American Psychological Association Press.
- Carlson, J. G., Chemtob, C. M., Rusnak, K., Hedlund, N. L., & Muraoka, M. Y. (1998). Eye movement desensitization and reprocessing for combat-related posttraumatic stress disorder. *Journal of Traumatic Stress, 11*, 3-24.
- Carrigan, M. H., & Levis, D. J. (1999). The contributions of eye movements to the efficacy of brief exposure treatment for reducing fear of public speaking. *Journal of Anxiety Disorders, 13*, 101-118.
- Cerone, M. R. (2000, November). *EMDR treatment of combat-related guilt: A study of the effects of eye movements*. Poster presented at the annual meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.
- Chambless, D.L., Baker, M.J., Baucom, D.H., Beutler, L.E., Calhoun, K.S., Crits-Christoph, P., et al. (1998). Update on empirically validated therapies. *The Clinical Psychologist, 51*, 3-16.
- Chemtob, C. M., Nakashima, J., & Carlson, J. G. (2002). Brief-treatment for elementary school children with disaster-related PTSD: A field study. *Journal of Clinical Psychology, 58*, 99-112.
- Chemtob, C. M., Tolin, D. F., van der Kolk, B. A., & Pitman, R. K. (2000). Eye movement desensitization and reprocessing. In E. B. Foa, T. M. Keane, & M. J. Friedman (Eds.), *Effective treatments for PTSD: Practice guidelines from the International Society for Traumatic Stress Studies* (pp. 139-155, 333-335). New York: Guilford Press.
- Christman, S., & Garvey, K. (2000, November). *Episodic versus semantic memory: Eye movements and cortical activation*. Poster presented at the 41st Annual Meeting of the Psychonomic Society, New Orleans.

- Davidson, P. R., & Parker, K. C. H. (2001). Eye movement desensitization and reprocessing (EMDR): A meta-analysis. *Journal of Consulting and Clinical Psychology, 69*, 305-316.
- De Jongh, A., Ten Broeke, E., & Renssen, M. R. (1999). Treatment of specific phobias with eye movement desensitization and reprocessing (EMDR): Protocol, empirical status, and conceptual issues. *Journal of Anxiety Disorders, 13*, 69-85.
- De Jongh, A., van den Oord, H. J. M., & Ten Broeke, E. (in press). Efficacy of eye movement desensitization and reprocessing (EMDR) in the treatment of specific phobias: Four single-case studies on dental phobia. *Journal of Clinical Psychology*.
- Devilley, G. J., & Spence, S. H. (1999). The relative efficacy and treatment distress of EMDR and a cognitive behavioral trauma treatment protocol in the amelioration of post traumatic stress disorder. *Journal of Anxiety Disorders, 13*, 131-157.
- Devilley, G. J., Spence, S. H., & Rapee, R. M. (1998). Statistical and reliable change with eye movement desensitization and reprocessing :Treating trauma with a veteran population. *Behavior Therapy, 29*, 435-455.
- Fensterheim, H. (1996). Eye movement desensitization and reprocessing with complex personality pathology: An integrative therapy. *Journal of Psychotherapy Integration, 6*, 27-38.
- Feske, U. (1998). Eye movement desensitization and reprocessing treatment for posttraumatic stress disorder. *Clinical Psychology: Science and Practice, 5*, 171-181.
- Feske, U., & Goldstein, A. (1997). Eye movement desensitization and reprocessing treatment for panic disorder: A controlled outcome and partial dismantling study. *Journal of Consulting and Clinical Psychology, 36*, 1026-1035.
- Fine, C. G., & Berkowitz, S. A. (2001). The wreathing protocol: The imbrication of hypnosis and EMDR in the treatment of dissociative identity disorder and other maladaptive dissociative responses. *American Journal of Clinical Hypnosis, 43*, 275-290.
- Foa, E. B., & Meadows, E. A. (1997). Psychosocial treatments for posttraumatic stress disorder: A critical review. *Annual Review of Psychology, 48*, 449-480.
- Foa, E. B., & McNally, R. J. (1996). Mechanisms of change in exposure therapy. In R. M. Rapee (Ed.), *Current controversies in the anxiety disorders* (pp. 329-343). New York: Guilford.
- Foa, E. B., Riggs, D. S., Massie, E. D., & Yarczower, M. (1995). The impact of fear activation and anger on the efficacy of exposure treatment for posttraumatic stress disorder. *Behavior Therapy, 26*, 487-499.
- Foster, S., & Lendl, J. (1996). Eye movement desensitization and reprocessing: Four cases of a new tool for executive coaching and restoring employee performance after setbacks. *Consulting Psychology Journal: Practice and Research, 48*, 155-161.
- Goldstein, A. J., de Beurs, E., Chambless, D. L., & Wilson, K. A. (2000). EMDR for panic disorder with agoraphobia: Comparison with waiting list and credible attention-placebo control condition. *Journal of Consulting and Clinical Psychology, 68*, 947-956.
- Goldstein, A., & Feske, U. (1994). Eye movement desensitization and reprocessing for panic disorder: A case series. *Journal of Anxiety Disorders, 8*, 351-362.
- Grant, M., & Threlfo, C. (in press). EMDR in the treatment of chronic pain. *Journal of Clinical Psychology*.
- Greenwald, R. (1996). Is EMDR being held to an unfair standard? Rejoinder to Van Ommeren (1996). *Professional Psychology: Research and Practice, 28*, 306.
- Ironson, G. I., Freund, B., Strauss, J. L., & Williams, J. (2002) A comparison of two treatments for traumatic stress: A pilot study of EMDR and prolonged exposure. *Journal of Clinical Psychology, 58*, 113-128.
- Kaslow, F., Nurse, A. R. & Thompson, P. (2002). EMDR facilitated couple and family therapy. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.
- Kavanaugh, D. J., Freese, S., Andrade, J., & May, J. (2001). Effects of visuospatial tasks on desensitization to emotive memories. *British Journal of Clinical Psychology, 40*, 267-280.

- Korn, D. L., & Leeds, A. M. (in press). Preliminary evidence of efficacy for EMDR resource development and installation in the stabilization phase of treatment of complex posttraumatic stress disorder. *Journal of Clinical Psychology*.
- Krystal, S., Prendergast, J., Krystal, P., Fenner, P., Shapiro, I., & Shapiro, K. (2002). Transpersonal psychology, eastern nondual philosophy and EMDR. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.
- Lazrove, S., & Fine, C. G. (1996). The use of EMDR in patients with dissociative identity disorder. *Dissociation, 9*, 289-299.
- Lazarus, C. N., & Lazarus, A. A. (2002). EMDR: An elegantly concentrated multimodal procedure. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.
- Lee, C., Gavriel, H., Drummond, P., Richards, J. & Greenwald, R. (in press). Treatment of post-traumatic stress disorder: A comparison of stress inoculation training with prolonged exposure and eye movement desensitization and reprocessing. *Journal of Clinical Psychology*.
- Lipke, H. (1999). *EMDR and psychotherapy integration*. Boca Raton, FL: CRC Press.
- Lohr, J., Tolin, D., & Kleinknecht, R. A. (1995). An intensive investigation of eye movement desensitization of medical phobias. *Journal of Behavior Therapy and Experimental Psychiatry, 26*, 141-151.
- Lohr, J. M., Tolin, D. F., & Kleinknecht, R. A. (1996). An intensive investigation of eye movement desensitization of claustrophobia. *Journal of Anxiety Disorders, 10*, 73-88.
- Lohr, J. M., Tolin, D. F., & Lilienfeld, S. O. (1998). Efficacy of eye movement desensitization and reprocessing: Implications for behavior therapy. *Behavior Therapy, 29*, 123-156.
- Lohr, J. M., Lilienfeld, S. O., Tolin, D. F., & Herbert, J. D. (1999). Eye movement desensitization and reprocessing: An analysis of specific versus nonspecific factors. *Journal of Anxiety Disorders, 13*, 185-207.
- Lyons, J. A., & Keane, T. M. (1989). Implosive therapy for the treatment of combat-related PTSD. *Journal of Traumatic Stress, 2*, 137-152.
- MacCulloch, M. J., & Feldman, P. (1996). Eye movement desensitization treatment utilizes the positive visceral element of the investigatory reflex to inhibit the memories of post-traumatic stress disorder: A theoretical analysis. *British Journal of Psychiatry, 169*, 571-579.
- Macklin, M., Metzger, L.J., Lasko, N. B., Berry, N. J., Orr, S. P., & Pitman, R. K. (2000). Five-year follow-up study of eye movement desensitization and reprocessing therapy for combat-related posttraumatic stress disorder. *Comprehensive Psychiatry*.
- Manfield, P. (Ed.). (1998). *Extending EMDR*. New York: Norton.
- Marcus, S. V., Marquis, P., & Sakai, C. (1997). Controlled study of treatment of PTSD using EMDR in an HMO setting. *Psychotherapy, 34*, 307-315.
- Marks, I. M., Lovell, K., Noshirvani, H., Livanou, M., & Thrasher, S. (1998). Treatment of posttraumatic stress disorder by exposure and/or cognitive restructuring: A controlled study. *Archives of General Psychiatry, 55*, 317-325.
- Maxfield, L., & Hyer, L. A. (in press). The relationship between efficacy and methodology in studies investigating EMDR treatment of PTSD. *Journal of Clinical Psychology, 58*, 23-41.
- Maxfield, L., & Melnyk, W. T. (2000). Single session treatment of test anxiety with eye movement desensitization and reprocessing (EMDR). *International Journal of Stress Management, 7*, 87-101.
- McFarlane, A. (1999, November). *Comparison of EMDR with CBT in PTSD patients*. Paper presented at the annual meeting of the International Society for Traumatic Stress Studies, Miami, FL.
- McNally, R. J. (1999). On eye movements and animal magnetism: A reply to Greenwald's defense of EMDR. *Journal of Anxiety Disorders, 13*, 617-620.

- Montgomery, R. W., & Ayllon, T. (1994). Eye movement desensitization across subjects: Subjective and physiological measures of treatment efficacy. *Journal of Behavior Therapy and Experimental Psychiatry*, 25, 217-230.
- Muris, P., & Merckelbach, H. (1997). Treating spider phobics with eye movement desensitization and reprocessing: A controlled study. *Behavioral and Cognitive Psychotherapy*, 25, 39-50.
- Muris, P., Merckelbach, H., Holdrinet, I., & Sijsenaar, M. (1998). Treating phobic children: Effects of EMDR versus exposure. *Journal of Consulting and Clinical Psychology*, 66, 193-198.
- Muris, P., Merckelbach, H., van Haften, H., & Nayer, B. (1997). Eye movement desensitization and reprocessing versus exposure in vivo. *British Journal of Psychiatry*, 171, 82-86.
- Paulsen, S. (1995). Eye movement desensitization and reprocessing: Its cautious use in the dissociative disorders. *Dissociation*, 8, 32-44.
- Perkins, B., & Rouanzoin, C. (2002) A critical evaluation of current view regarding eye movement desensitization and reprocessing (EMDR): Clarifying points of confusion. *Journal of Clinical Psychology*, 58, 77-97.
- Pitman, R. K., Orr, S. P., Altman, B., Longpre, R. E., Poire, R. E & Macklin, M. L. (1996). Emotional processing during eye-movement desensitization and reprocessing therapy of Vietnam veterans with chronic post-traumatic stress disorder. *Comprehensive Psychiatry*, 37, 419-429.
- Power, K. G., McGoldrick, T., & Brown, K. (2001, May). *A controlled trial of eye movement desensitisation and reprocessing versus imaginal exposure and cognitive restructuring, versus waiting list control in posttraumatic stress disorder*. Paper presented at the European Society for the Study of Traumatic Stress, at Edinburgh, Scotland.
- Ray, A.L., & Zbik, A. (2002) Cognitive behavioral therapies and beyond. In C.D. Tollison, J.R. Satterthwaite, & J.W. Tollison (Eds.) *Practical pain management (3rd edition)*. Phila., PA: Lippencott, pp. 189-208.
- Renfrey, G., & Spates, C. R. (1994). Eye movement desensitization and reprocessing: A partial dismantling procedure. *Journal of Behavior Therapy and Experimental Psychiatry*, 25, 231-239.
- Rogers, S., & Silver, S. M. (2002). Is EMDR an exposure therapy?: A review of trauma protocols. *Journal of Clinical Psychology*, 58, 43-59.
- Rogers, S., Silver, S., Goss, J., Obenchain, J., Willis, A., & Whitney, R. (1999). A single session, controlled group study of flooding and eye movement desensitization and reprocessing in treating posttraumatic stress disorder among Vietnam war veterans: Preliminary data. *Journal of Anxiety Disorders*, 13, 119-130.
- Rosen, G. R. (1999). Treatment fidelity and research on eye movement desensitization and reprocessing (EMDR). *Journal of Anxiety Disorders*, 13, 173-184.
- Rothbaum, B. O. (1997). A controlled study of eye movement desensitization and reprocessing for posttraumatic stress disorder sexual assault victims. *Bulletin of the Menninger Clinic*, 61, 317-334.
- Rothbaum, B. O. (2001, November). Prolonged exposure versus EMDR for PTSD rape victims. In P. A. Resick (chair), *Three clinical trials for the treatment of PTSD: Outcome and dissemination*. Paper presented t the annual meeting of the Association for the Advancement of Behavior Therapy, at Philadelphia, PA.
- Sanderson, A., & Carpenter, R. (1992). Eye movement desensitization versus image confrontation: A single-session crossover study of 58 phobic subjects. *Journal of Behavior Therapy and Experimental Psychiatry*, 23, 269-275.
- Scheck, M. M., Schaeffer, J. A., & Gillette, C. S. (1998). Brief psychological intervention with traumatized young women: The efficacy of eye movement desensitization and reprocessing. *Journal of Traumatic Stress*, 11, 25-44.
- Scott, M. J. & Stradling, S. G. (1997). Client compliance with exposure treatments for posttraumatic stress disorder. *Journal of Traumatic Stress*, 10, 523-526.
- Servan-Schreiber, D. (2000). Eye movement desensitization and reprocessing: Is psychiatry missing the point? *Psychiatric Times*, 17, 36-40.

- Shapiro, F. (1989a). Efficacy of the eye movement desensitization procedure in the treatment of traumatic memories. *Journal of Traumatic Stress Studies*, 2, 199-223.
- Shapiro, F. (1989b). Eye movement desensitization: A new treatment for post-traumatic stress disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, 20, 211-217.
- Shapiro, F. (1991). Stray Thoughts. *EMDR Network Newsletter*, 1, 1-3.
- Shapiro, F. (1993). Eye movement desensitization and reprocessing (EMDR) in 1992. *Journal of Traumatic Stress*, 6, 417-421.
- Shapiro, F. (1995). *Eye movement desensitization and reprocessing: Basic principles, protocols and procedures* (2nd ed.). New York: Guilford Press.
- Shapiro, F. (1999). Eye movement desensitization and reprocessing (EMDR): Clinical and research implications of an integrated psychotherapy treatment. *Journal of Anxiety Disorders*, 13, 35-67.
- Shapiro, F. (2001). *Eye movement desensitization and reprocessing: Basic principles, protocols and procedures* (2nd ed.). New York: Guilford Press.
- Shapiro, F. (2002). Paradigms, processing, and personality development. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.
- Shapiro, F. (Ed.) (2002) *EMDR as an Integrative Psychotherapy Approach: Experts of Diverse Orientations Explore the Paradigm Prism*. Washington, DC: American Psychological Association Press.
- Sharpley, C. F. Montgomery, I. M., & Scalzo, L. A. (1996). Comparative efficacy of EMDR and alternative procedures in reducing the vividness of mental images. *Scandinavian Journal of Behaviour Therapy*, 25, 37-42.
- Siegel, D. J. (2002). The developing mind and the resolution of trauma: Some ideas about information processing and an interpersonal neurobiology of psychotherapy. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.
- Silver, S., & Rogers, S. (2001). *Light in the heart of darkness: EMDR and the treatment of war and terrorism survivors*. Norton.
- Smyth, N., & Poole, D. (2002). EMDR and cognitive behavior therapy. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.
- Solomon, M., & Neborsky, R. J. [Eds.] (2001). *Short term therapy for long term change*. New York: Norton.
- Solomon, S. D., Gerrity, E. T., & Muff, A. M. (1992). Efficacy of treatments for posttraumatic stress disorder. *Journal of the American Medical Association*, 268, 633-638.
- Sprang, G. (2001). The use of eye movement desensitization and reprocessing (EMDR) in the treatment of traumatic stress and complicated mourning: Psychological and behavioral outcomes. *Research on Social Work Practice*, 11, 300-320.
- Stickgold, R. (2002). EMDR: A putative neurobiological mechanism of action. *Journal of Clinical Psychology*, 58, 61-75.
- Thordarson, D., Taylor, S., Maxfield, L., Wilensky, M. S., Ladd, W. G., Lanius, U. F., Federoff, I. C., & Sochting, I. (2001, July). *EMDR, exposure therapy, and relaxation training for PTSD: A controlled outcome study*. Paper presented at the World Congress meeting of Association for the Advancement of Behavior Therapy, Vancouver.
- Teasdale, J. D. (1999). Emotional processing, three modes of mind and the prevention of relapse in depression. *Behaviour Research and Therapy*, 37, (Suppl. 1), 53-77.
- United Kingdom Department of Health. (2001). *Treatment choice in psychological therapies and counselling evidence based clinical practice guideline*. London: Author. WEB: <http://www.doh.gov.uk/mentalhealth/treatmentguideline/>
- van den Hout, M., Muris, P., Salemink, E., & Kindt, M. (2001). Autobiographical memories become less vivid and emotional after eye movements. *British Journal of Clinical Psychology*, 40, 121-130.

- van der Kolk, B. A. (2002). Beyond the talking cure: Somatic experience and subcortical imprints in the treatment of trauma. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.
- Vanderlaan, L. (in press). The resolution of phantom limb pain in a 15-year old girl using eye movement desensitization and reprocessing. *EMDR Clinician*.
- Van Etten, M. L., & Taylor, S. (1998). Comparative efficacy of treatments for posttraumatic stress disorder: A meta-analysis. *Clinical Psychology and Psychotherapy*, 5, 126-144.
- Vaughan, K., Armstrong, M. F., Gold, R., O'Connor, N., Jenneke, W., & Tarrier, N. (1994). A trial of eye movement desensitization compared to image habituation training and applied muscle relaxation in post-traumatic stress disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, 25, 283-291.
- Wachtel, P. L. (2002). EMDR and psychoanalysis. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.
- Wilensky, M. (2000). Phantom limb pain. *EMDRAC Newsletter*, 4, (2).
- Wilson, D., Silver, S. M., Covi, W., & Foster, S. (1996). Eye movement desensitization and reprocessing: Effectiveness and autonomic correlates. *Journal of Behavior Therapy and Experimental Psychiatry*, 27, 219-229.
- Wilson, S. A., Becker, L. A., & Tinker, R. H. (1995). Eye movement desensitization and reprocessing (EMDR) treatment for psychologically traumatized individuals. *Journal of Consulting and Clinical Psychology*, 63, 928-937.
- Wilson, S. A., Tinker, R., Becker, L. A., Hofmann, A., & Cole, J. W. (2000, September). *EMDR treatment of phantom limb pain with brain imaging (MEG)*. Paper presented at the annual meeting of the EMDR International Association, Toronto.
- Wolpe, J. (1990). *The practice of behavior therapy* (4th ed.). New York: Pergamon Press.
- Young, J. E., Zangwill, W. M., & Behary, W. E. (2002). Combining EMDR and schema-focused therapy: The whole may be greater than the sum of the parts. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism*. Washington, DC: American Psychological Association Press.