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Eye-Movement Desensitisation
Symptom Change in Post-traumatic Stress Disorder

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A novel approach is described for the treatment of post-traumatic stress disorder (PTSD). Eye-movement desensitisation (EMD) requires the patient to generate images of the trauma in the mind and define physiological and emotional arousal states. While concentrating on these states, lateral multisaccardic eye movements are induced. Ten consecutive cases are reported who presented with symptoms originating from a range of traumas. The effectiveness of EMD in reducing symptoms outlined by DSM–III–R is described. An independent rater indicated that eight of the ten cases showed considerable improvement in PTSD symptoms following EMD, which was maintained at follow-up. Particular reference is given to the 'specificity' of EMD in treating symptoms and the changing pattern of effect at follow-up.

Post-traumatic stress disorder (PTSD) has been recognised since 1980 when it was included in the DSM–III (American Psychiatric Association, 1980). It is a disorder precipitated by an unusually threatening event, generally of serious proportions. Examples of documented cases include combat experience (Streimer *et al*, 1986), torture (Kinzie *et al*, 1990), bush fire (McFarlane, 1988) and armed hold-up (Vaughan & Tarrier, 1992).

The disorder is characterised by the experience of an event that is typically "outside the range of usual human experience" (DSM–III–R, p. 250) (American Psychiatric Association, 1987). The symptoms of PTSD include: (a) re-experiencing the trauma through nightmares, intrusive thoughts and intense psychological distress; (b) avoidance of stimuli reminiscent of the trauma, or numbing in general responsiveness; and (c) increased arousal indicated by hypervigilance, irritability and distractibility (DSM–III–R). To qualify for a diagnosis of PTSD, an individual must present with a minimum of one re-experiencing, three avoidance and two arousal symptoms.

Since the inclusion of PTSD in the diagnostic nomenclature, significant developments have been made in behavioural approaches to treatment. For example, Keane *et al* (1989) reported the successful use of implosive therapy with 24 Vietnam veterans and demonstrated maintenance of treatment effects at six-month follow-up. Similarly, Vaughan & Tarrier (1992) employed exposure treatment with ten people suffering PTSD from a range of events including child sexual abuse, torture and violent robbery.

While they improve particular symptoms, exposure approaches, particularly flooding, are not without criticism. The main comment surrounds the use of a procedure which requires high levels of anxiety for prolonged periods of time (Fairbank & Brown, 1987). In addition, some commentators question the number of sessions required for therapeutic effect. From nine (Rothbaum *et al*, unpublished, 1990) to 14 sessions (Keane *et al*, 1989) are required to eliminate the anxiety. This time length, combined with the enforced high levels of anxiety for prolonged periods, has been of some concern to the therapeutic community.

As Wolpe (1982) noted, exposure techniques are also not without failure. For example, Keane *et al* (1989) were unable to explain the minimal improvement of four of their 17 patients on measured PTSD symptoms. Similarly, of the ten cases reported by Vaughan & Tarrier (1992), several still reported problems with nightmares, social isolation and generalised anxiety.

A technique receiving some interest from the therapeutic and scientific community is eye-movement desensitisation (EMD) (Shapiro, 1989*a*,*b*). Shapiro (1989*b*) suggests that EMD overcomes many of the shortcomings of traditional behavioural techniques. The technique was developed quite by chance, when Shapiro noted in herself the disappearance of recurring, disturbing thoughts concurrent to automatic multi-saccadic eye movements. The therapeutic potential of the saccadic eye movement was investigated through systematically inducing eye movements in volunteers and clients, and EMD evolved from this.

While traditional desensitisation methods are based on the premise that the individual habituates to the memory which is causing anxiety, the central premise of EMD requires 're-processing' of the trauma memories. This is achieved by cognitive reconstruction of the event, resulting in replacement of the anxiety-provoking thoughts with preferred thoughts. Briefly, the EMD procedure requires the

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individual to create in his/her mind a visual image of the traumatic event from which relief is wished (Shapiro, 1989*b*). The individual is then requested to isolate a word or phrase which represents a belief about the visual image. Shapiro cited examples including, "I am helpless", or "I have no control" (1989*b*, p. 204). While the patient repeats the phrase to himself, bilateral saccadic eye movements are induced by following the therapist's fingers, which are moved rapidly from side to side across the visual field (Shapiro, 1989*a*). An integral part of the procedure is replacing the negative belief statement with a preferred belief statement: e.g. "I have control", "I am worthy" (1989*b*, p. 204). While the patient repeats this statement to himself, saccadic eye movements are again induced. This re-processing procedure is repeated with all memories which are causing anxiety, until no reported anxiety is evident.

EMD procedure has been suggested as able to

> ". . .(1) desensitize a highly traumatic memory within a short period of time without intense and prolonged anxiety; (2) produce a cognitive restructuring of the verbalized self-statement or assessment along with a redefined visual representation; and (3) cause congruent and substantial behavioral shifts" (Shapiro, 1989*a*, p. 201).

That memories of the traumatic event can be desensitised without prolonged periods of enforced anxiety is perhaps the greatest benefit of EMD. Further, since redefinition of the visual memory and behavioural shifts can occur in as little as one session, the subject improves faster than by more traditional exposure techniques.

The successful use of the EMD technique with PTSD sufferers has been documented in the literature by authors other than Shapiro (Wolpe & Abrams, 1991; Puk, 1991; Marquis, 1991). While these accounts have demonstrated significant and rapid change in symptoms, no attempt has been made to systematically investigate the differential effect of EMD on the three major symptom groups identified by DSM-III-R. Traditional exposure therapies have been examined in this way. For example, Keane *et al* (1989) noted that the effect of implosive therapy upon their experimental group was largely derived from a reduction in the re-experiencing symptoms, with little change to the symptoms of numbing or social avoidance, suggesting some specificity of effect. Following initial success with EMD on PTSD sufferers, the present authors noted similar differential response patterns. While the EMD procedure may be of great utility in reducing the re-experiencing, it may not be successful in eliminating all PTSD-related symptoms or associated complications (Shapiro 1989*a*). To clearly understand the therapeutic impact of EMD, a more extensive analysis of symptom change is required.

A confusing phenomenon occurring in some PTSD treatment research has been the use of instruments which do not measure PTSD symptoms comprehensively. Either subjective judgements are made (e.g. Puk, 1991; Shapiro, 1989*a*), or standardised instruments are employed which measure phenomena independent of PTSD (e.g. Richards & Rose, 1991; Wolpe & Abrams, 1991). For example, Puk (1991) documented clear clinical improvement in two case studies following an EMD treatment regime. However, the measurement of change was based on the patient's rating of the Subjective Units of Disturbance (SUD) scale (Wolpe, 1982) elicited before and immediately after each administration of EMD. Puk cited one case rating the vividness of a mental picture at 100 prior to treatment, reduced to 10 following six sets of saccadic eye movements. The dependent variable – vividness of the traumatic memory – represents only one dimension of the PTSD condition. In another case, Richards & Rose (1991), describing an exposure treatment for PTSD, used measurements of depression, phobic anxiety and social adjustment. As Baggaley (1991) emphasised, if outcome of treatment approaches is to be judged by improvements in PTSD symptoms, then measurements need to measure this phenomenon comprehensively.

The purpose of the present study is to examine the effectiveness of EMD in reducing the categorised symptoms indicated by DSM-III-R. Ten consecutive case studies are analysed and the 'specificity' of treatment effects immediately following EMD treatment and at follow-up are demonstrated. To address the measurement problems outlined above, dependent measures which comprehensively describe PTSD symptoms are used.

Method

Participants in the study were three men and seven women who had been referred to the Hornsby Ku-Ring-Gai Hospital PTSD Clinic for treatment. Details of the patients are given in the case reports following this paper, in order of their referral; they are thus consecutive cases from the larger clinical population of the PTSD clinic. The patients ranged in age from 18 to 45 years, with a mean of 34.1 years.

The patients presented with a range of traumas including armed hold-up, motor vehicle accident, incest and freak storms. All had long-standing PTSD symptoms (mean 22 months) with the exception of two, whose symptoms were in response to traumas less than one month prior to referral. It is recognised that these two cases did not strictly fit DSM-III-R criteria for PTSD diagnosis. However, the authors agreed that their symptom profiles were such that both would probably have fitted the criteria after one

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Table 1
Number of PTSD symptoms in each DSM-III-R category upon referral

Case no.	Category A	Category B	Category C	Category D	Category E	PTSD diagnosis
1	Yes	3	4	4	No	No
2	Yes	3	4	4	Yes	Yes
3	Yes	2	5	5	Yes	Yes
4	Yes	2	5	5	Yes	Yes
5	Yes	3	4	5	Yes	Yes
6	Yes	3	3	4	Yes	Yes
7	Yes	4	6	5	No	No
8	Yes	3	5	5	Yes	Yes
9	Yes	4	7	4	Yes	Yes
10	Yes	4	6	5	Yes	Yes

month. Table 1 outlines the presentation of number of symptoms within each category, indicating DSM-III-R diagnosis for all ten cases.

Three cases received concurrent medication during the investigation. The two cases prescribed anti-depressants responded positively to EMD within five days of the commencement of medication. Medications were unchanged throughout the course of EMD treatment and follow-up.

Measurements

Two dependent variables were considered important for the investigation: a measure of PTSD symptoms representative of DSM-III-R criteria, and a measure of depression. For the PTSD symptoms, the PTSD Structured Interview (SI-PTSD; Davidson *et al*, 1989) was used. The interview was developed originally with reference to the DSM-III (1980) criteria for PTSD, and was changed slightly to reflect the changes of DSM-III-R (Davidson *et al*, 1989). The original SI-PTSD scale has been tested with regard to reliability and validity, demonstrating an inter-rater reliability coefficient of 0.90, and good diagnostic and construct validity. At the time of writing, the additional items indicative of DSM-III-R changes had demonstrated good inter-rater reliability, and were undergoing other validity and reliability testing. For the current investigation, adequate inter-rater reliability properties were found with a coefficient of 0.80, achieved between M.W. and R.G.

The revised SI-PTSD was adapted to suit the sample under investigation. The original interview focused in part towards combat or war. Such questions were made more general so as to reflect the heterogeneity of the traumas experienced by our subjects. Each question was scored on a scale from 0 to 4 ('completely absent' to 'extremely debilitating, affecting one's daily life'). A score of 2 for a given symptom indicated the minimum threshold for qualification according to DSM-III-R guidelines. For example, for the item measuring nightmares, a zero was indicated if the individual reported no nightmares, up to 4 where nightmares were extremely severe, occurred at least three times per week and/or the individual's partner didn't sleep in the same room because of ongoing nightmares. A score of 2 was given if the individual suffered moderately from nightmares which were disturbing and woke them up.

A total score for each category of DSM-III-R symptoms was obtained, reflecting the severity of presentation, as well as the number of symptoms present within categories, used to indicate the presence or absence of PTSD according to DSM-III-R criteria.

Depression was measured with the Hamilton Rating Scale for Depression (Hamilton, 1960). This measure was considered important because PTSD is often thought to be accompanied by depression (Davidson & Foa, 1991), and was included to examine whether treatment made any impact upon this other Axis I disorder.

Procedure

All patients were required to undergo an evaluation interview before and after treatment and at follow-up, approximately 8-12 weeks after the beginning of treatment. These interviews were conducted by R.G., who did not administer any of the treatments.

During the treatment sessions, conducted by K.V., each patient was asked to focus on the image of the particular trauma which caused the most distress. To ensure that this request was clear, the therapist used the following instructions: "I want you to run through the scene as though you were watching a video. Stop the video when you get to the most distressing part, and hold that visual picture in your mind". The therapist encouraged each patient to describe this picture in detail. For each exposure it was considered critical that the patient brought to mind the whole image, together with all associated affect. This was encouraged by asking for such details as colour, distance, and picture specifics. At these times the therapist occasionally asked such questions as, "Given that the trauma occurred X years/months ago, how long ago does it *feel* like it happened?". To measure the vividness of the image, the patient was asked to assign a vividness rating to the picture from 1 to 10 ('not at all vivid' to 'extremely vivid').

Following image generation, a belief statement concerning the visual image was requested of the patient. For example for one patient who had been held at gunpoint, her visual picture concerned the gunman's eyes. The belief statement generated was "he's out of control". The original procedure by Shapiro (1989*a*,*b*) recommended that following assignment of this belief statement, a 'preferred' belief statement about the image should be generated. The level of

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distress experienced by individuals in our sample was such that they were unable to consider such a statement. The authors found it more practical to generate the preferred belief statement once the distress associated with the traumatic image had reduced to a more comfortable level (see below).

Next, each patient was asked to isolate the place in the body where the anxiety concerning the visual image was focused. Again, considerable detail of these experiences was extracted, so as to ensure that the patient had accurately located and characterised the physiological symptoms (examples included the chest, head and throat). To measure the distress associated with these experiences, an SUD rating (Wolpe, 1982) was assigned by the patient to indicate the amount of anxiety/distress caused by the image and thought. This scale ranged from 1 to 10 ('no distress' to 'extreme distress').

While focusing on the visual image, the belief statement and the body anxiety, the patient was asked to follow the therapist's index finger with their eyes. The therapist's finger was held upright about 23–30 cm (9–12 in.) from the patient's face. Starting from the centre position, the therapist moved his finger laterally across the patient's field of vision from the extreme left to the extreme right at a rate of approximately one back-and-forth movement every 1–1½ seconds. Approximately 14 back-and-forth movements were made before stopping at the centre position (see below for exact figures). Shapiro (1989*a*,*b*) recommended a rate of one back-and-forth movement per second, with between 15 and 25 before stopping.

This procedure was repeated as often as was necessary for the anxiety to be reduced to a level at which the patient could consider a 'preferred' belief statement, usually at an SUD level of approximately 5. To construct this preferred statement, the therapist asked the patient to imagine what he/she would like to feel instead of the distress experienced by the generated image. The therapist used instructions like, "Given that the incident did occur, how would you prefer to remember it?" (the armed hold-up patient, for instance, replied "It's over, I'm safe"). Patients described in this sample sometimes found it difficult initially, and required prompting by the therapist. Shapiro's (1989*b*) procedure recommended that the individual give a rating on a Validity of Cognition Scale from 1 to 7 ('the preferred belief statement feels completely untrue' to 'the preferred belief statement feels quite true and comfortable'). The assignment of a numerical Validity of Cognition rating was not recorded in the present investigation, though individuals were asked qualitatively throughout how 'true' the constructed preferred belief statement felt.

Following the construction of the preferred belief statement, the patient was instructed to take a deep breath, and then bring the same visual picture to mind again. The therapist directed the patient to assign an SUD rating to the anxiety level provoked by the reinstated picture. The patient was then directed to consider the visual image with respect to the preferred belief statement. While retaining the visual image in the mind, patients were requested to repeat the preferred belief statement to themselves while the saccadic eye movements were again induced.

The procedure described was repeated until anxiety was removed for each distressing visual image and the patient was able to fit the preferred belief statement comfortably with the memory. The same procedure was repeated for all distressing visual images.

Patients received from one to six sessions of treatment (mean 3.3). Each session ran for 45–60 minutes. All patients were seen individually, with the exception of one, who was accompanied on two sessions by a parent.

Treatment sessions for eight of the ten patients were videotaped. Analysis of these tapes showed that from four to 12 EMD 'sets' were administered (mean 7.4), where a 'set' represented each group of multidirectional saccadic eye movements. Each set comprised a mean of 14.1 back-and-forth movements (range 11–16) and were conducted at a rate of one back-and-forth movement per 1.39 s (range 1.2–1.6).

Results

The results were first examined for differences in the three categories of symptoms indicated by DSM–III–R and the depression scores following treatment. To analyse these differences, a series of paired *t*-tests were performed ($P<0.05$). Table 2 summarises the subtotals of each category depicting the PTSD disorder and the depression scores across the evaluation periods. Overall, all three PTSD symptom categories showed significant improvement following treatment. Compared by *t*-tests, total 're-experiencing', total 'avoidance' and total 'hyperarousal' were all significantly reduced. Improvement was most notable for the re-experiencing category, with a marked change following treatment. The mean depression score also showed a significant improvement following treatment. Treatment gains were significant at follow-up for total re-experiencing and total avoidance, but not for the total hyperarousal or depression scores.

The results were next examined for significance of individual symptom change following treatment. To analyse the differences in mean DSM–III–R symptom scores before and after treatment, and follow-up, separate series of *t*-tests were performed with Bonferroni corrections for each category of symptoms. Table 3 presents the results for each symptom measured by the SI-PTSD across the evaluation periods. Under the re-experiencing category, flashbacks and dreams showed a significant improvement following treatment and at follow-up, while re-living and psychological distress to events symbolic of the trauma did not improve.

Interesting results were obtained in the other categories, with different individual symptom patterns revealed after treatment and at follow-up. In the avoidance category, following treatment there were no symptoms which had significantly improved, but at follow-up the scores for 'interest in activities' and 'distance from others' were shown to improve significantly. In the hyperarousal category, while sleep disturbance, hypervigilance and startle demonstrated significant improvement following treatment, these were not significant at follow-up.

Some qualitative results of the EMD procedure were also noted. When patients were asked to generate visual images

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Table 2
DSM-III-R PTSD category total symptom score and depression symptom score before and after treatment across patients ($n = 10$)

Item	Mean score before	s.d.	Mean score after	s.d.	Mean score at follow-up	s.d.	*t*-value before/after	*t*-probability before/after	*t*-value before follow-up	*t*-probability before follow-up
Category B:										
Re-exposure subtotal	11.25	3.06	4.3	4.00	4.2	2.57	6.06	0.0005**	6.602	0.0003**
Category C:										
Avoidance subtotal	14	4.42	9.7	4.81	8.3	5.89	2.43	0.0381*	4.414	0.0017**
Category D:										
Hyperarousal subtotal	13.8	1.3	9.6	3.27	12.6	4.86	3.66	0.0064**	1.16	NS
Hamilton Score	18.5	8.53	11.5	6.39	11.9	5.97	2.46	0.0285*	1.421	NS

*$P<0.05$
**$P<0.01$

of the trauma in the mind and provide details of these, it appeared that some were reminded of other traumatic memories, until that time not considered. For five of the ten cases, painful memories associated with events unrelated to the referred trauma were brought up and treated as part of the therapy.

Calculation of mean SUD level prior to treatment was 8.7 (range 5–10), compared to mean SUD level after treatment of 2.3 (range 0–8). An association was observed between the reduced ratings of vividness of the mental image of the trauma on a reduction in the perceived 'recentness' of the trauma. Patients also reported difficulty in holding the mental image in the mind as therapy progressed.

For eight of the ten cases external validation of the improved results was gained. Three family members and five professionals (two psychologists and three psychiatrists) were consulted. In all cases, results indicated by the SI-PTSD were confirmed by these independent sources, reflecting the stability of scores.

Discussion

The summary of results indicates that EMD is effective in reducing some of the symptoms of PTSD. All patients showed some clinical improvement, with eight of the ten changing dramatically. That these results were obtained by a group of researchers independent of the pioneer of the technique suggests EMD is worthy of future research and clinical use.

Table 3
Individual PTSD DSM-III-R symptom scores before and after treatment across patients ($n = 10$)

Item	Mean score before	s.d.	Mean score after	s.d.	Mean score at follow-up	s.d.	*t*-value before/after	*t*-probability before/after	*t*-value before follow-up	*t*-probability before follow-up
Category B:										
Flashbacks	2.5	1.51	1.0	1.15	0.4	0.84	3.31	0.0045*	3.84	0.004*
Dreams	3.3	1.06	0.7	1.25	1.2	1.13	5.46	0.0002*	7.58	0.0001*
Re-living	2.4	1.94	0.7	1.49	0.5	1.08	2.67	0.0141	2.64	0.0298
Event reminder	2.8	0.92	1.9	1.20	2.1	1.20	1.78	NS	2.33	0.0445
Category C:										
Thoughts	2.1	1.29	1.3	0.95	1.8	1.13	1.44	NS	0.76	NS
Places	2.0	1.25	1.10	1.20	1.5	1.35	1.87	0.0473	0.86	NS
Amnesia	0.8	0.79	0.8	0.92	0.7	0.67	0.00	NS	0.56	NS
Interest	2.7	1.06	1.7	1.25	1.2	0.92	2.53	0.016	4.02	0.003*
Distant	2.4	1.07	2.0	0.94	1.5	1.18	2.45	0.018	3.86	0.0039*
Affection	1.9	1.37	1.3	1.34	0.9	1.10	1.07	NS	2.53	0.0319
Future	2.2	1.40	1.3	1.25	0.7	0.82	1.96	0.0405	3.14	0.0119
Category D:										
Sleep disturbance	2.8	0.92	2.0	1.15	2.3	1.06	3.21	0.0054*	1.86	NS
Irritability	1.8	1.23	1.8	0.79	1.9	1.10	0.00	NS	−2.87	NS
Concentration	2.3	1.06	1.1	0.88	2.1	0.88	2.25	0.0255	0.514	NS
Hypervigilance	2.3	0.95	1.3	1.06	2.0	1.05	3.35	0.0042*	0.635	NS
Startle	2.3	0.82	1.4	1.17	2.0	1.05	3.86	0.0019*	0.76	NS
Remind. phys.	2.7	0.87	1.9	1.20	2.3	0.95	1.35	NS	2.53	0.0353

*Significant following Bonferroni correction.

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An overall examination of DSM–III–R categories demonstrates that for the ten patients reported here, EMD was effective for the re-experiencing, avoidance and hyperarousal categories of symptoms after treatment. Additionally, EMD had a significant impact on depression. Though at follow-up the hyperarousal symptom category and depression score did not maintain significant gain, the stability of effect upon re-experiencing and avoidance highlights the potential usefulness of EMD in the treatment of PTSD.

Some specificity of effect is indicated when symptoms within each category are examined. In the re-experiencing category, flashbacks and dreams showed significant improvement following EMD. The importance of this result is highlighted by the stability of the improvement maintained at follow-up. We suggest that these symptoms most directly represent the phenomena of event recurrence for the individual and preserve the immediacy of the trauma memory. For the ten cases reported, there appeared to be two types of sensations common to these symptoms. First, there were sensory sensations, usually visual in nature, but proprioceptive, tactile, auditory, gustatory or olfactory sensations were also reported. Second, concurrent visceral sensations were also experienced, for example churning of the stomach, or crushing of the chest. Immediately following EMD, patients indicated that both sensations were much less intense, and felt as if the experience was in the past, incapable of evoking the strong emotional and physical responses common prior to treatment. At follow-up assessment, patients maintained that the event was continuing to recede into the past, and rather than anxiety, more normal emotions such as regret or sadness were evoked when the memory was called up.

While it is true that one of the symptoms of the re-experiencing category, 're-living', did not demonstrate significant improvement, this may be because of the diffuse nature of the symptom. 'Re-living' appears to contain elements of the other Category B symptoms. Of those individuals who participated in the current case series, many reported difficulty in distinguishing flashbacks from re-living, and reported similar psychological and physiological arousal in both symptoms. The effect of EMD upon re-living may have been subsumed by the other significant results.

Further examination of the re-living symptom category showed that psychological distress caused by events symbolic of the trauma showed a non-significant effect following EMD treatment. It appears that this symptom may not be manifested as true re-experiencing with sensations, but instead as non-specific distress. DSM–III–R refers to this symptom as "intense psychological distress at exposure to events that symbolise or resemble, an aspect of the traumatic event. . ." (p. 250). To illustrate, one patient (Case 7) experienced flashbacks, nightmares and intense affect following an armed hold-up at the restaurant where she worked. Following treatment, while the first three symptoms disappeared, she reported feelings of anger and uneasiness when she thought about, or was reminded of, the hold-up. Such feelings were not accompanied by symptoms akin to 're-living' the event, that is, neither by the type of sensory sensation, nor by the feelings of vividness and immediacy of the trauma memory common to her initial presentation. It is suggested that this symptom may be viewed as one which develops secondary to the immediate trauma, a possibility first advanced by Davidson *et al* (1989). These secondary symptoms may be more resistant to treatment, requiring intense cognitive therapy aimed at modifying underlying assumptions.

The symptom profile in the avoidance category, measured after treatment and at follow-up, presents a similarly interesting pattern. EMD had no significant effect on any of the symptoms in the Avoidance category immediately following treatment, but at follow-up, 'interest in activities' and 'distance from others' had improved. Perhaps these symptoms can also be viewed as secondary symptoms. As the improvement in flashbacks and dreams is maintained, it is logical that secondary symptoms will also gradually improve.

Within the hyperarousal category, while 'hypervigilance' and 'startle' demonstrated significant improvement following EMD treatment, this improvement did not hold at follow-up. One possible interpretation of this result is related to additional life stresses. It was observed that five of the ten cases continued to experience additional anxieties related to life events throughout the follow-up period. These included litigation, financial stresses and alcohol abuse. The symptoms of hypervigilance and startle, reflective of general anxiety, may be exacerbated by such life events.

Some explanation of the significance of sleep disturbance is necessary. Sleep disturbance, indicated by "difficulty falling or staying asleep" (DSM–III–R, p. 250) cannot be perceived as a symptom indicative of direct trauma recurrence for the individual. On first appearance, its improvement following EMD may be understood as a corollary effect of the improvement in dreams. However at follow-up, sleep disturbance did not maintain the improvement that dreams did, suggesting this may not be the case. Interestingly, at follow-up all the Category D

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symptoms lost significance, suggesting instead that sleep disturbance may be representative of the general anxiety depicted by the Hyperarousal category.

Analysis of the results is interesting from the perspective of individual cases and individual symptoms and serves to highlight some of the different responses to EMD. For five of the ten cases, there was a shift in content of memories for desensitisation. It appears that EMD acted to 'open' other distressing memories for treatment. In three cases, these other traumas were rapidly desensitised. For example, one patient required desensitisation to the first assault she had suffered and another recalled previous violent experiences. In these cases, EMD was applied immediately to these memories and therapy was able to revert to the presenting problem.

The two cases which did not improve require comment. Both indicated no decrease in SUD level (mean 7.5) following treatment, and no change in the recentness or anguish of the traumas they had undergone. The reasons for the poor outcome of both cases may be that the desensitisation time was insufficient. To illustrate, one patient reported an improvement in SUD rating from 10 to 7 in her first session of treatment. For the first time in many months she was free of nightmares that night. Unfortunately, despite the improvement she had gained from EMD, she found the procedure unpleasant and did not wish to undergo further treatment.

An important contribution made by this research is the comprehensive description of the dependent variable measuring PTSD symptoms. Unlike some past research (Shapiro, 1989*a*; Richards & Rose, 1991; Puk, 1991), the overall PTSD phenomena were clearly delineated by using the SI-PTSD interview. Further, the change in PTSD symptoms was assessed by an independent researcher who was unaware of treatment details. We believe that we have addressed Baggaley's (1991) comments by the measurement procedure used here. It is proposed that future studies ensure that all PTSD symptoms defined by DSM–III–R are adequately measured in an objective, methodologically sound fashion.

The present results shed no further light on the nature of EMD, but the importance of investigating a possible therapeutic mechanism is acknowledged. Shapiro (1989*a*,*b*) suggested that the nature of EMD might be founded in Pavlov's (1927) proposal that the experience of a traumatic event upsets the brain's balance in excitation and inhibition, and EMD acts to restore this balance. Similarities have also been suggested with hypnosis (Evans, 1991), but these seem unlikely on an *a priori* basis. Despite the elaboration of the procedure and putative mechanisms which have been proposed, little is known at this early stage about what aspects of the EMD treatment are necessary or why it might work. Comments by Wolpe & Abrams (1991) summarise the current state, ". . . it is to be hoped that the accumulation of published information leads to studies that may fill in the gaps in our knowledge" (p. 43).

Appropriately controlled process studies which vary the procedure could shed further light as to the nature of EMD. Some direction could be gained from manipulation of the speed of bilateral eye movements, variation in rhythm, or comparing focusing on a stationary target with focusing on the moving finger.

The efficacy of EMD relative to other recognised treatments for PTSD is yet to be established. The present authors are currently conducting a large-scale controlled study comparing PTSD symptom change following EMD, image habituation training (Vaughan & Tarrier, 1992) and applied muscle relaxation training (Ost, 1987).

Clearly, before EMD is established as a useful treatment, considerable further research is required. The initial results presented here indicate EMD has differential effect on some symptoms related to the immediate trauma occurrence, and on symptoms which may be perceived as secondary to the trauma. Its utility in changing the specific symptoms comprising PTSD must be established with further replication. EMD must be compared to other acknowledged treatment procedures, and emphasis must be placed upon understanding the nature of the mechanism for EMD so that theory can be clearly defined.

Case histories and descriptions of treatments

Case 1. B was a 35-year-old mechanical operator who was involved in an armed robbery at her workplace. Six years before this she had encountered a similar attack in another workplace. During that incident a gun was pushed into her mouth and oral pharynx, resulting in severe soft tissue damage which required multiple operations. Symptoms of PTSD developed, and were treated on an out-patient psychiatric basis. PTSD symptoms and litigation for her injuries had settled just 12 months before the present hold-up. Her position, in the maintenance section of an electrical store, was the first she had held since the last trauma, and met her need not to be exposed to the general public where she feared attack. Although not physically harmed during this hold-up, she was made to lie on the ground and was roughly kicked. B developed a continuous feeling of terror, recurring nightmares and flashbacks. Acute, severe PTSD was diagnosed and she was referred for emergency treatment one week after the incident.

B received three sessions of EMD and her intrusive symptoms improved. She still had many generalised anxiety symptoms focused on her fear about returning to work.

Case 2. C was a 45-year-old shopkeeper, of Italian background, who 7 months before referral had been held up in her family grocery store. She had always been a fearful person and for many years had suffered various nightmares. During the hold-up C believed she

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was going to be shot, as there had been a triple fatal shooting in the vicinity 3 months previously. Two months before the hold-up her mother had died in Italy, and C felt grieved and generally dissatisfied with her life in Australia. Following the hold-up she developed nightmares and flashbacks with depressive and generalised anxiety symptoms. Each time a customer entered the shop she was startled and became anxious. She was concerned about her 8-year-old child who also suffered nightmares.

Four sessions of EMD reduced the intrusive symptoms. However, C reported continued vigilance at work and poor sleep. Many of her symptoms related to her ambivalent feelings about her mother's death and her lack of commitment to life in Australia.

Case 3. D was a 25-year-old student who was involved in a serious car accident five months before referral. She was catapulted through the front window and received eye injuries resulting in loss of monocular vision and severe facial lacerations. She had significant facial disfiguration and multiple scarring. Since the accident she had suffered nightmares every second night, daily flashbacks, phobic anxiety while driving and constant rumination concerning her pain, scarring and inability to recall the instant before the accident.

This case was the only one presenting with clearly defined psychogenic amnesia. D had complete amnesia following her memory of the car going out of control. Her next memory was being placed in an ambulance. The amnesia was the symptom which was most distressing for her and she constantly ruminated as to what could have happened. The EMD technique was applied to the memories immediately prior to and following the amnesia.

After two sessions of EMD, D reported a complete resolution of her nightmares, and her preoccupation with the amnesia ceased although she never regained her memory of the trauma. She expressed a determination to put the accident behind her.

Case 4. E was a 45-year-old computer operator who lived alone. She had been involved in a freak storm while returning from work approximately 13 months before referral. When a tree was completely uprooted in front of her car she thought she was going to be crushed. When she got home she found the roof of her house blown off and much of the contents destroyed. Immediately afterwards she resigned her job, which she had held for 12 years, and became embroiled in complex negotiations with the insurance company concerning damages, as well as with numerous tradesmen whom she hired and fired. E became intensely storm-phobic and constantly scanned the sky for signs of bad weather. She reported nightmares every night and daily flashbacks, although in the week before referral she indicated only one flashback. Upon examination E was intensely circumstantial and vague, making symptom measurement difficult.

Two sessions of EMD were completely successful in eliminating the nightmares and flashacks. Some hypervigilance and storm phobia remained, although markedly reduced.

Case 5. F was a 42-year-old divorced policeman, referred from a psychiatric hospital several hundred miles away in a country area. He had been sectioned to the psychiatric hospital under the Mental Health Act following an episode where he was reported to 'go beserk'. He had been involved in a shooting eight months before referral, where he attempted to apprehend two men involved in a robbery. The men tried to run him over and then shot randomly at him. Following the incident F suffered daily flashbacks and nightmares. He also reported continual feelings of apprehension, severe depression, and generalised anxiety. His alcohol intake had escalated to an intake of 150 mg ethanol/day. At referral he had not worked for six months and was increasingly isolated.

F was treated for one week as an in-patient and upon admission was administered prothiaden (50 mg, increased to 150 mg at the end of the week). On discharge, F's nightmares and flashbacks had completely disappeared following daily EMD sessions. Depression and irritability remained, and on review after one month, anxiety levels were also high, mainly focused upon his fear of becoming violent if he returned to work.

Case 6. G was a 35-year-old bus driver who had suffered from nightmares, daily flashbacks, continual vigilance and apprehension of disaster following an incident where a person threw himself in front of the bus G was driving. He was referred after K.V. treated his wife for major depression, when she reported her husband's irritability and apathy. G was a compulsively self-reliant man and was deeply ashamed of his symptoms.

One session of EMD completely resolved his symptoms.

Case 7. H was an 18-year-old student who was involved in an armed hold-up at the fast-food restaurant where she worked. During the hold-up she was forced to lie on the floor and a gun was pushed into her back. She thought she was going to be killed. Later that night she became hysterical, and had hallucinations that the attack was recurring. One week following the hold-up she was urgently referred in an alarming state of almost global insomnia, continual re-experiencing of the trauma and sensations as though the gun was pressing into her back.

During the first session H hallucinated that the robber was in the consultation room, witnessed by her alarmed whisper of "Sssh, don't make a sound. Hide". Of the gun pressing into her back, H said in an alarmed voice during the EMD exercise: "It's killing me, it's hurting. Take it away". The response of this case to treatment was most dramatic. The illusions and hallucinations, which initially intensified, quickly abated. At the end of the third session H returned to work, and then to school one week later.

Case 8. J was a 26-year-old soldier who had been involved in a gassing accident about seven years before referral. During the accident three of his colleagues were killed. Following this J developed intense headaches, which had completely stopped him from working for the last year, as well as regular nightmares. Despite considerable psychiatric and psychological treatment, his headaches had not responded and he remained severely incapacitated by them. Upon referral J presented as a rather guarded young man, who had great difficulty monitoring and reporting internal states. He indicated feelings of detachment, and difficulty in expressing emotions. J also felt guilt because one of his acquaintances, who had a family, was killed and not him, a single person. He indicated constant severe headaches and intense stomach tension when he thought of specific memories of the incident, for example his colleague's leg twitching. J admitted he often ruminated over the whole incident.

EMD treatment eliminated the nightmares and markedly reduced J's distress when he remembered the accident scene. No further understanding was gained of the nature of his difficulties.

Case 9. K was a 42-year-old housewife suffering intense flashbacks and nightmares surrounding repeated incest experiences during her childhood. Her memories of her father's sexual conduct towards her returned approximately two years before the referral. She had been almost totally preoccupied with these memories for the last five months, which prevented her from caring adequately for her two children. She was admitted to the emergency department of the hospital with an acute overdose, and transferred for in-patient treatment at the PTSD Clinic. On the second day of her admission EMD treatment commenced and mianserin (30 mg) was administered.

Following the second session of EMD, K's flashbacks and nightmares improved dramatically. Despite this, she reported that the requirements of the EMD treatment distressed her greatly and declined further recommended treatment.

Case 10. L was a 28-year-old administrator with a long-standing diagnosis of multiple personality disorder. She was referred from a country area for treatment of vivid nightmares, flashbacks and

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illusions of recurrence of particularly sadistic incestuous experiences. Five years previously she had begun to feel overwhelmed by these memories and had been under regular psychiatric care since. Her treatment prior to referral comprised multiple hospitalisations, two courses of electroconvulsive therapy, psychotropic drugs of varying types and combinations, and expert psychodynamic therapy, which had been the only treatment of benefit.

L was admitted for treatment as an in-patient and following four sessions of EMD she reported a subjective improvement. Upon return home, her treating psychiatrist reported that although L appeared to have gained emotional control, the benefit was short-lived and her re-experiencing symptoms soon regained their vividness and immediacy.

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