# IS ORIENTING REFLEX INVOLVED IN EMDR SUCCESSFUL?

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*We tried to "dissect" the EMDR method in the component desensitization through rapid eye movements (EMD), that is also the original part, to explain the neurophysiological functioning. Charney et al. say that a lot of persistent symptoms of PSTD are caused by an elevate arousal of NVS, particularly due to the increase of norepinephrine. Others hypothesize, again, that EMDR method is so rapid because it is based on Classic Conditioning. Pavlov found that every new stimulus of environment causes to the organism (animal or human) an immediate orienting response due to the arousal of Autonomic Nervous System. In this situation the animal begins to look around moving its eyes laterality (as it happens during ocular movements of EMD): if it perceives a danger in the environment, it stimulates a visceral negative response (hyperactivation that means fear) that leads to an avoidance behaviour (stiffening) and/or fighting. In other cases it causes a visceral positive response (de-arousal process that means reassurance) that leads to an approach behaviour through interaction or exploration.*
*The EMD should produce an orienting reflex in the patient in a protective situation like a psychotherapeutic setting: that means an important reduction of neuro-vegetative nervous system activity (de-arousal) and some visceral positive response. We propose an experimental design with a single subject (ABACADA) by interruption treatment and by monitoring neurophysiological functions through biofeedback instruments to test this neurophysiological hypothesis.*
***Key-words:*** *Rapid Eye Movements, Sleep Functions, Skin Potential Reaction, Orienting Reflex.*

Desensitization and elaboration through the eye movements (EMDR), is one of the most recent findings in scientific research, for the treatment of PTSD. According to Shapiro, EMDR facilitates the speedy elaboration of distressing events at a neurophysiological level, through a number of exercises of "dual attention". The final result is a cognitive-affective well-being of our patients.

In order to explain the neurophysiological basis of EMDR working, we have selected the method we considered most suitable, to investigate desensitization through the eye movement, just the original part of the technique.

Patients suffering from PTSD have always been considered highly reactive to the traumatic memories of the trauma, from a psycho-physiological point of view.

Some authors postulated the involvement of the right hemisphere in the conditioning of the stressful stimuli (Forbes, et al., 1994). Other studies evidenced the hypothesis that REM (rapid eye movements) during sleep allow the elaboration and storage of information in memory (Wilson, et al., 1996) (see fig. n. 1).

In fact, during daily waking activity, the two hemispheres do not work in unison, but they rather work "by turns", also according to their functions (see fig. n. 2): the left hemisphere often predominates, it is in fact involved in the language and in all logic

processes. During sleep instead, oniric activity is often under control of the right hemisphere, whereas the left hemisphere is less activated.

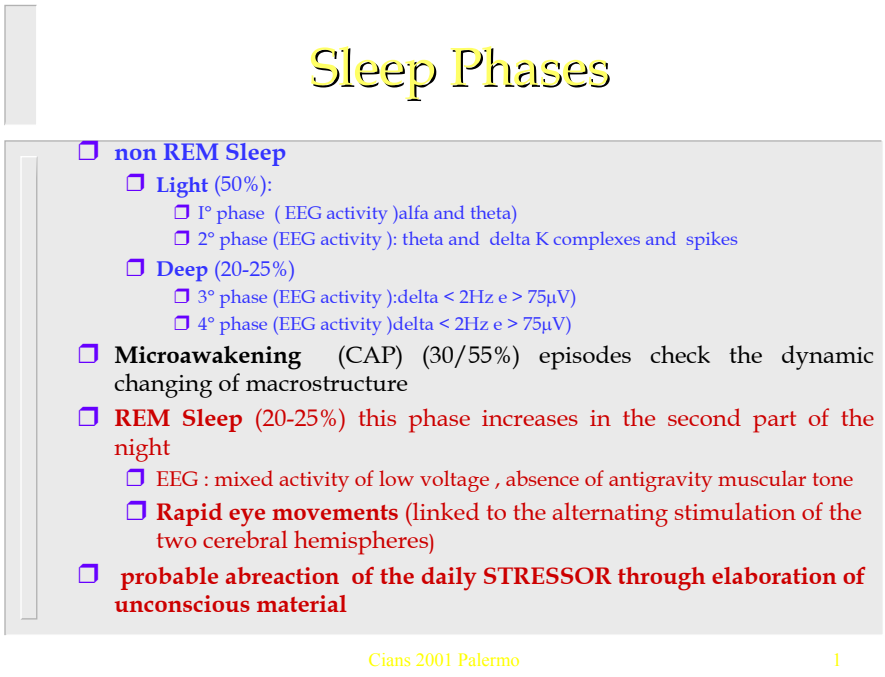


FIG. 1


FIG. 2

Eye movements during dreams are supposed to be useful in enhancing the communication between the two hemispheres. This "co-operation" is necessary to elaborate information and little traumatic events which occurred during the day.

This could explain why many therapies based on verbal methods, fail in helping the patient to elaborate traumatic events. Moreover, Van der Kolk et al. (1997) have already demonstrated through PET (Spect Scan) a different concentration of the radioactive tracer prior and after an EMDR treatment in some cerebral areas probably involved in the traumatic process: after EMDR treatment the visualisation of the radioactive tracer was not possible anymore.

This would explain the consequences of saccadic movements at a cerebral level, but does not tell why.

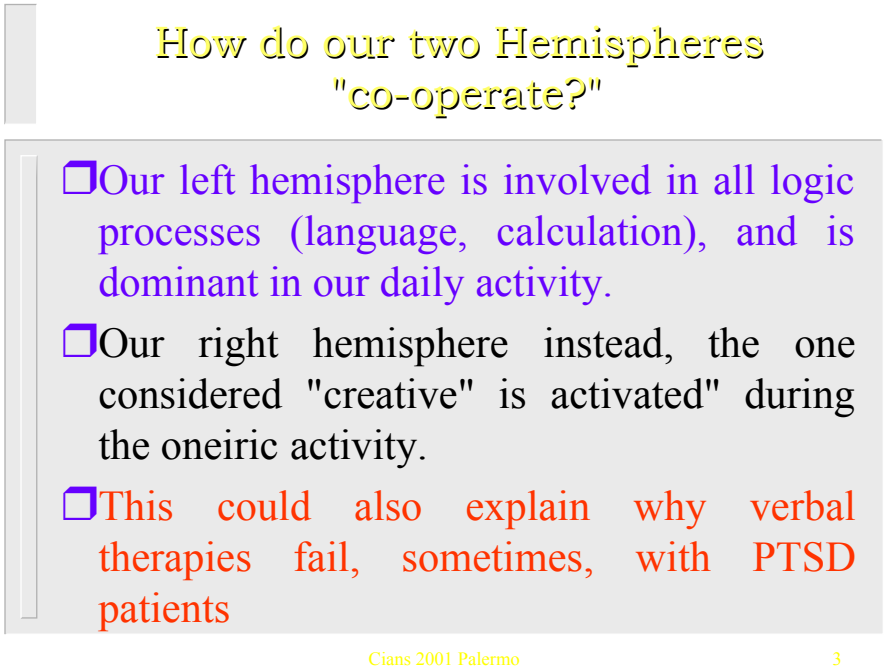


FIG. 3

In some recent works, Charney (1996) suppose that many persistent symptoms characteristic of PTSD , are the expression of an increased noradrenergic activity. Studies which have been conducted on memory consolidation, suggest that noradrenaline levels increase consistently with the increased arousal level (see fig. n. 3).

A possible behavioural explanation of panic/fear reaction is based on the "two factor theory" of Mowrer. According to this theory, two kinds of mechanisms are at the basis of learning fear and avoidance: classic and operant conditioning. In a first phase, a neutral stimulus becomes associated to an unconditioned stimulus (e.g. autonomic nervous system activation), which evokes anxiety or fear. The previous neutral stimulus has now acquired distress eliciting properties, so it has become "conditioned" and its presence evokes anxiety, fear and so on.

This theory would explain how in PTSD a particular stimulus can evoke a high physiological arousal. On the other side, there is another hypothesis to explain the rapid

effectiveness of EMDR treatment, in accordance to the Pavlovian theory of classic conditioning: the visceral positive element of orienting reflex may be associated to dangerous memories clinically induced, in order to remove its distressing effect.

The *Orienting Reflex* is responsible for evoking in animals and human beings as well, an immediate response to every minimal change of the surrounding world, in order to orientate the specific sense organ towards the event which changed the situation around, inducing to explore and find the event itself (see fig. n. 4).

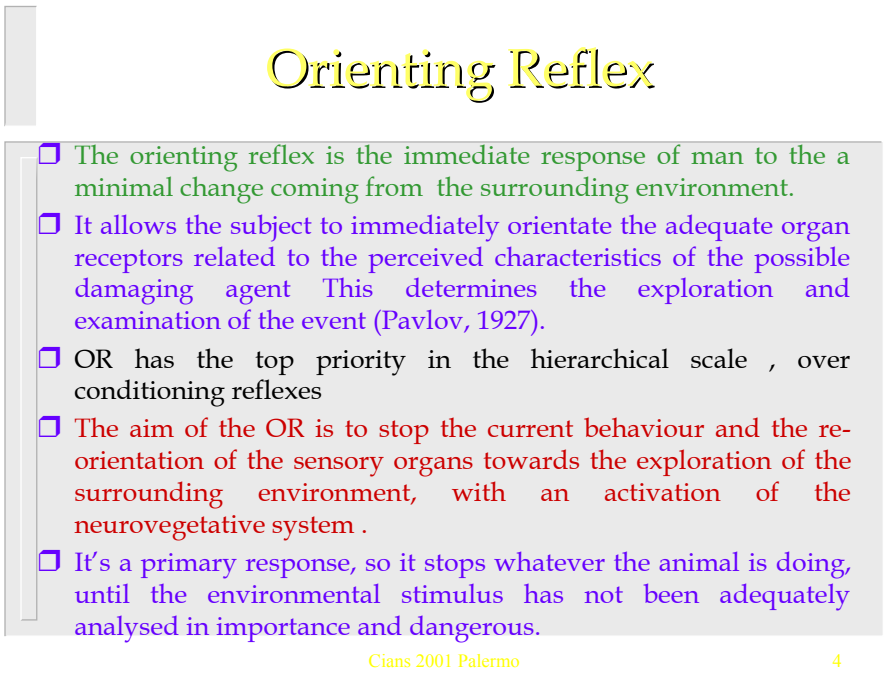


FIG. 4

The biological-evolutionary meaning of this reflex seems to be clear: animals must know if the environment in which they live is safe or dangerous. So the animal will begin to look around with attention, only moving the eyes; if there is a perception of a danger, it will activate a *negative* visceral response, (arousal, hyper-activation, fear), and it will produce a behaviour of avoidance, or rigidity, or fighting or getting away.

If no danger is perceived, in the surrounding environment, a *positive* visceral response will be produced. This is a process of reassurance and lowering of the arousal level, which brings to an approaching behaviour of interaction and exploration.

So we may suppose that the exploration with lateral eye movements, (which is similar to the REM of the sleep), has become an adaptive process during the phyletic evolution, that allows the animal to distinguish between danger and opportunity.

EMDR would induce a reflex, similar to orienting reflex, in humans. As this bilateral stimulation is administered in order to produce a situation in which no danger can be detected by the subject in the surrounding space, the effect is a decrease of the arousal level and pleasant visceral perceptions. So, if we induce the learnt conditioned response (e.g. anxiety or fear in a specific situation), associated to an explorative response, of no danger, as happens during EMDR, this inhibits the previously learnt fear, and after a series

of positive emotions associated to the conditioned stimulus, we will obtain the extinction of the unconditioned response. At the end, the eye movement is supposed to produce a decrease of the arousal level (positive visceral response). When this effect is associated together with the reminding of a traumatic event, it would have a potent inhibitory effect.

In our previous experience we realised that SPR activity decreased while associating Biofeedback-monitoring during EMDR treatment (see fig. n. 5).

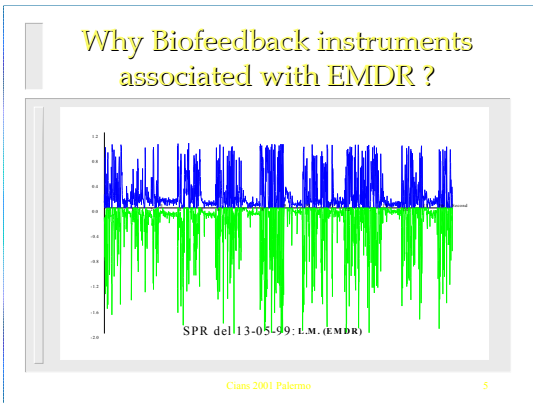


FIG. 5

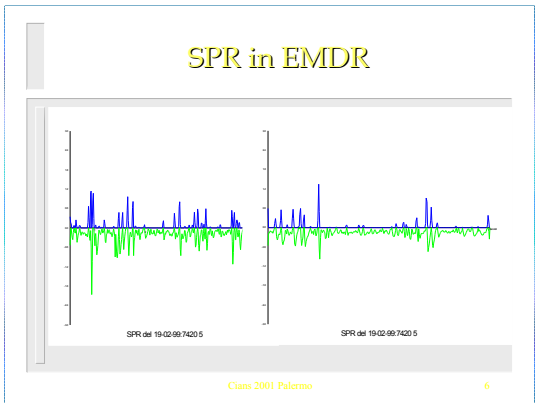


FIG. 6

We conducted our experimental work on the basis of these observations.

We decided to use the biofeedback machine, in order to investigate the profile of the psychophysiological variables, with particular regard to SPR and EMG channels (see fig. n. 6).

The electrodermic potential response (SPR), measures the activation potential level of sweat glands, and represents the activity of sympathetic nervous system, which is direct expression of the alert status of reticular activating system.

The outcome is the registration of a sinusoid curve, with positive spikes (expression of the defence reflex), and negative spikes (expression of orientating reflex, and cognitive activity orientated to a purposing behaviour). EMG permits to register the muscular tension.

In order to avoid *bias*, we tried to maintain fixed all the variables investigated in the EMDR protocol, varying only one of them. The independent variable was in this case represented by the *saccadic movements* (OM), without the reprocessing part or the cognitive restructure. In order to support our hypothesis, we adopted a single subject experimental design, with a scheme of interruption of treatment (ABACADA).

We know this study is not completely correct from a methodological point of view, as every treatment might have been influenced by the previous one.

Data obtained may be used only to execute a visual analysis, and should be just considered of indicative value.

In this study design, the baseline (A), will have the duration of 240 seconds. During this time, the patient is asked to relax, trying to think of pleasant events. Thereafter, phase B will be introduced, and its duration will be of 120 seconds. During this time, the patient will be asked to focus his attention on a traumatic event. After this phase, another relaxing period self-governing will be introduced. After 2 minutes, variable C will be introduced. It consists of saccadic movements during the patient's focus on the traumatic event. We would like to remind that the target traumatic event has to be maintained unvaried during

the whole experiment. After phase C, another relaxing phase will follow, of the duration of 240 seconds. The last variable (D) introduced consists of administration of luminous stimuli. These different phases have been registered continuously.

Thereafter, the parameters (positive and negative spikes) will be compared in the different phases (B, C, D), in order to investigate their characteristic in the different treatment phases (see fig. n. 7).

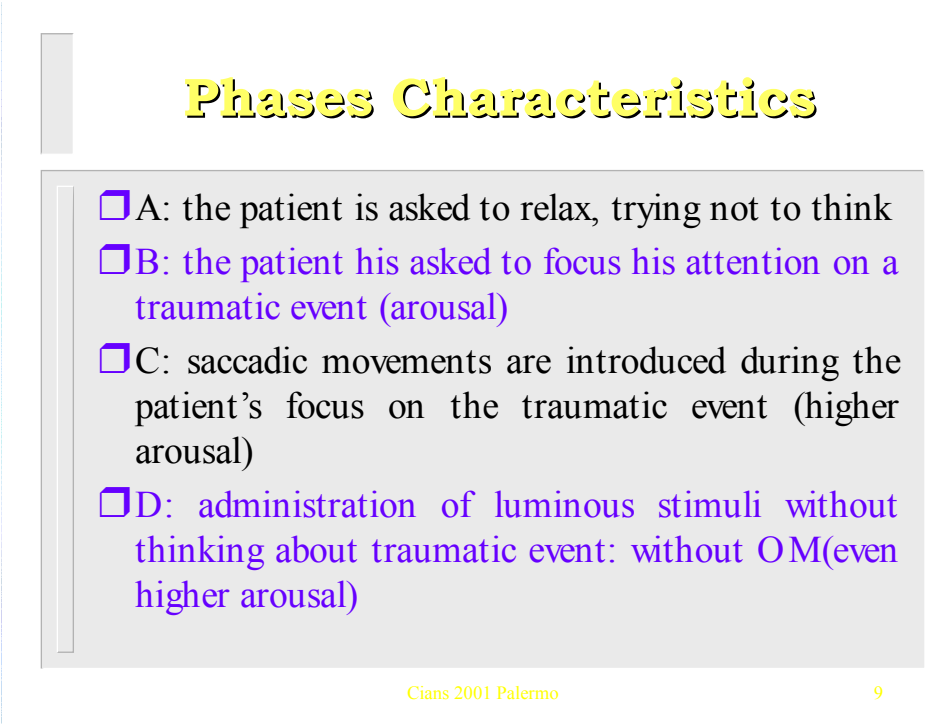


FIG. 7

**Results**

The graphics and data, that we are going to show you now, have been obtained from the above mentioned study design, see the following figures (n. 8, n. 9, n. 10, n. 11, n. 12).

Fig. n. 8. Continuous registration of all the variables investigated (emg, spr, hr, thermal), for the whole duration of 21 minutes.

Fig. n. 9. While reminding the stressful event without OM, Cardiac frequency is increasing, consistently with muscular tension, and an important activation of Spr as well.

Fig. n. 10. While reminding the stressful event with OM, emg, cf, and spr variables tend to decrease in the end of the stressful event reminding process, with a significant increase of the thermal index of relax.

Fig. n. 11. During the administration of intermittent light flashes, we can notice an important neurovegetative activation, especially of the cardiac frequency and of spr.

Fig. n. 12. In the final evaluation, a general stabilisation of the variables can be observed, even though cardiac frequency and hand temperature may be slightly increased.

# All session variables

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FIG. 8

# Stressor without OM

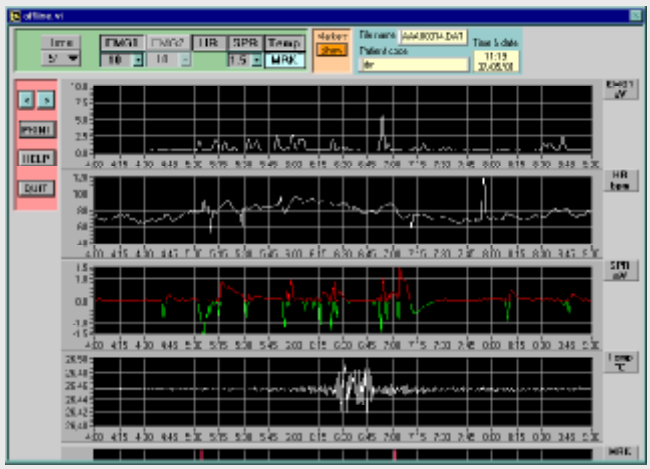

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FIG. 9

## Stressor with OM

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FIG. 10

## Administration of Luminous Stimulus

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FIG. 11

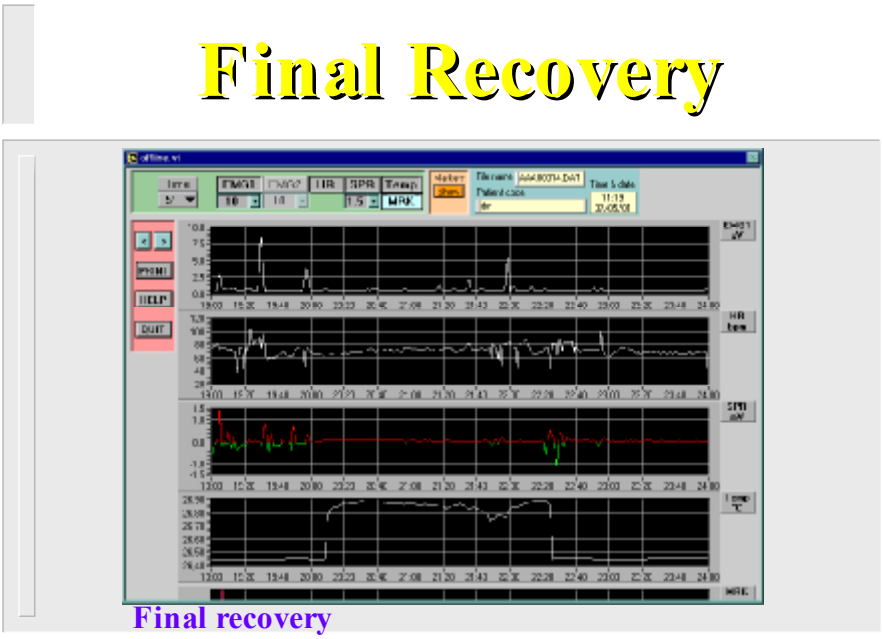


FIG. 12

## Conclusions

Through a visual analysis of the data, we can observe how the three different treatment phases are different from one another, also from a qualitative point of view. It is interesting to notice how "phase C" is characterised by high levels of activation. "Phase B" instead, is characterised by lower arousal levels.

These findings could suggest that alternating eye movements generate different arousal levels in comparison with other kind of physical stimuli. May be saccadic movements create an arousal activation which facilitate the elaboration of traumatic events. Other research projects are ongoing in our University, with the purpose of finding more detailed explanation regarding orienting reflex and saccadic movements, in the light of a more successful clinical application of EMDR technique in psychotherapy.

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