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THE EFFECT OF EMDR THERAPY ON THE NEGATIVE INFORMATION PROCESSING ON PATIENTS WHO SUFFER DEPRESSION

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Abstract

A cognitive science research on depression is presented. Specifically, patients with mayor depression were required to participate in a therapeutic process which involved the EMDR methodology (Eye Movement Desensitization and Reprocessing) and affective priming experiments, which showed the therapeutic impact over the emotional cognitive processing about relevant negative information of traumatic events. Results showed a significant change and also that there were participants who implemented a cognitive filter to eliminate the autobiographic negative words. Further, it was implemented a bias to facilitate the recognition of positive as well as negative stimuli. In the section of discussion, coincidences between conscious and unconscious evaluations are analyzed about overcoming of depression under this therapy.

Keywords: Depression; EMDR; affective priming; cognition; emotion.

Introduction

Under the argument that the thinking habits can be impacted in order to modify emotions and behaviors to get positives changes in the persons, the cognitive-behavioral therapy has been successful with patients with depression (Greenberger y Padesky, 1998). It is unknown which are the specific information processing mechanisms involved in the overcoming of that emotional disorder, but the existing data suggested that they participate actively in its maintenance. In that way, to achieve the recovery by intervening on the behavior of cognitive process, it is necessary to go beyond pointing out the presence of dysfunctional schemes and determine such mechanisms. Therefore, it is important to define a cognitive model that unites to the representational aspect of dysfunctional information stored in the long term memory (Beck, 1995; Bower, 1981) the processing aspect also, and to consider variables such as failed attempts to face the problem (Williams et. al., 1997).

One of the first models of human emotional information processing was proposed by Scherer (1984a, 1984b, 1987, 2001). Such model has been an advance in cognition and emotion and tries to specify what happens in short and long term memories, in attention processes and in reasoning stages during the assessment of an event. The hierarchical connotation that it suggests is of utmost relevance to perceiving the different levels of information processing on evaluations that are conducted after the therapeutic intervention and to know its impact in each level. In that way, the emotional valence identification studies

that involve reaction time inside the affective priming paradigm offer the option of measuring such impact, since depressive patients, in studies developed by Siegle (1999, 2001), showed a longer time of response (interference) to positive information while it was easier for them to recognize the negative with respect to the neutral one. As in these studies tasks demand automatic processing, along with the evaluative inventories commonly used that require answers on a conscious level, a complete assessment of the individuals could be made and therefore determine the multilevel effect of the treatment.

Hudicka (2004), states that in terms of emotional information processing, cognitive functioning can be explained as two big systems, both involving an automatic processing. The first one evaluates emotional information in a very short time (250 ms) and covers goals related to pleasure and survival. The second one, according to Scherer's parameters, amplifies analysis and includes a conscious emotional state that considers beliefs and personal schemata. At this stage of processing, the bias mechanism to evaluate the emotional valence is very important, since it is manifested in an inclination towards negativity on people who are prone to depression. Therefore, a dysfunctional scheme would help a depressive behavior to prevail.

Since the biased processing of the valence of the information in the automatic level can affect selective attention on the automatic and controlled level, it is important to achieve changes in the bias mechanisms of individuals through

therapy, so that they can monitor the events of their life in their adjustment process. The interest of this study was to observe the impact of therapy on those bias mechanisms to assess the negative emotional valence once patients reported to be recovered of depression.

Patients in this study where treated using EMDR therapy. Its main objective is to relocate negative experiences in the memory of the patient by turning them into adaptive learning experiences. This methodology can be categorized as an integrative psychotherapy and its theory and principles of treatment are given for Shapiro's Adaptative Information Processing Model (1993, 1994), which relates to the innate tendency of the brain to process disturbing life experiences and considers that pathological structure is inherent to stored information, insufficiently processed when a traumatic event happens. This model was developed in order to explain the speed on which clinical results are obtained when EMDR therapy is applied, no matter how long it had been since the traumatic events happened (Fensterheim, 1996; Manfield, 1998).

Considering the expected change in the evaluation of negative information when the emotional disorder was gone, the hypothesis was: when a person who suffers depression receives EMDR therapy, he or she shows changes in the evaluation of the negative emotional valence of the information that is part of a dysfunctional scheme. Such hypothesis supposes the assumption that therapy

to treat depression is successful because it stops the specific mechanisms of human information processing that help maintain it.

Method

With the purpose of observing how the participants were assessing the negative information relevant to autobiographic traumatic events through their EMDR therapeutic process, each one of them carried out emotional valence identification studies within the affective priming paradigm (Fazio et. al., 1986; Fazio, 1995, 2000, 2001; Fazio y Dunton, 1997). These studies were applied in three different moments. As that paradigm establishes that the emotional valence recognition of a stimulus depends on the emotional valence of another showed previously, a group of autobiographic negative stimuli was presented to the participants at the initial, middle and final phase of their treatment, to observe its impact on the negative emotional valence recognition of the second stimuli, which were also relevant to their disturbance experiences.

Subjects

From a group of 15 possible candidates were selected an intentionally mixed sample. It was integrated with three participants who were diagnosed with major depression, according to the parameters established in *Diagnostic and*

Statistical Manual of Mental Disorders, the revised fourth edition. The diagnostic was made clinically by an interview and psychometrically by using *Beck Depression Inventory*, second edition (Beck et. al., 1996).

Their characteristics were as follows:

No.	Gender	Age	Education Level	Socio-economic Level	Depression
1	Feminine	21	College Student	Lower middle	Moderate
2	Femenine	25	College Student	Lower middle	Minimal
3	Masculine	31	College Graduate	Lower middle	Mild

Therapeutic Process

Instruments and materials

The following instruments and materials were used:

- Beck Depression Inventory, second edition.

- Clinical history inventory.

- Shapiro's Clinical Manual (2005) as guidance to an accurate application of the standardized procedure of EMDR methodology.

- Record sheets to keep information of what happened between sessions.

- 8mm Sony videocassettes of 120 minutes to tape the sessions.

- Samsung video camera, SCX854 model.

- Tripod Solidex model

- EMDR Fidelity Rating Scales Institute to assess accuracy on treatment.

Procedure

The procedure was developed using the EMDR methodology. Its specific function was to help each participant to reprocess negative experiences that contributed to developing depression and were identified on the oral report the participants gave of their most disturbing events. This therapeutic approach is considered a methodology because it involves, beyond eye movements and other kinds of bilateral stimulation, a standardized procedure of eight phases (Shapiro, 2005), which are described as follows:

- First phase – Clinical history

  Apart from applying Beck Depression Inventory, the patient's clinical history with the ten most traumatic or disturbing events were gathered. Treatment was planned out to happen twice a week with sessions that were an hour and a half long. The total number of sessions for each participant depended on their requirements, but an average was of twelve sessions.

- Second phase – Preparation

  Besides the patient received an explanation about the methodology, the expectations about the effects of the treatment were established. A

strategy was also given for possible disturbances that might occur between sessions.

Unlike the first two phases that took place before the therapy, the following phases were carried out with each of the disturbing events. Bilateral stimulation (ocular, tactile and auditive) was essential on phases four, five and six.

- Third phase – Evaluation

  The event to reprocess was chosen, along with its components in terms of image, negative cognition, positive cognition and its degree of validity, emotion and level of disturbance and sensation.

- Fourth phase – Desensitization

  Focusing on the experience that was determined as the traumatic event, the patient had the freedom to spontaneously give information about it and changes in the disturbance were being evaluated until they disappeared.

- Fifth phase – Installation

Once the disturbance was gone, a previously defined positive cognition was installed. Such cognition was adaptively related to the original event, taking the patient's present-life circumstances into account.

- Sixth phase – Body check

The participant was asked to mentally examine his or her body while focusing on the event and the positive cognition in order to work with any residual tension.

- Seventh phase – Closure

After recognizing the patient's effort during the session, he or she received the necessary instructions to maintain an emotional balance between sessions, and a record sheet to describe any event that might arise after the session.

- Eighth phase – Follow up

The effects of treatment were evaluated beyond the therapy session. Once everything related to the past of the traumatic event was reprocessed, present stimuli that could trigger the disturbance were also treated, and finally, any situation that could arise in the future. This way,

the three slope standard protocol (past, present and future) of this therapeutic methodology was met with accuracy.

Because it is very important to remain accurate with EMDR procedure and standard protocol not only during clinical practice but on the research part also, all of the sessions were videotaped and evaluated subsequently with fidelity scales from the EMDR Institute. Maxfield and Hyer (2002) found in a meta-analysis they accomplished that the results obtained were closely related with the degree of fidelity to the procedure.

Emotional valence identification studies

Variables

In these studies, the independent variable consisted of congruent pairs of emotional words and pairs of neutral words. Congruence was established if the relationship between them was positive/positive, negative/autobiographic-negative, negative/no- autobiographic-negative and neutral/neutral. With regard to negative stimuli of each participant these were thirty words related to the ten most disturbing or traumatic events in her or his life and thirty words that did not be related.

On the other hand, the dependent variable was the reaction time. It was the time needed to recognize if the second word of each pair presented was emotional or neutral.

Instruments and materials

Stimuli or words considered for the emotional valence identification were presented to the participant in a computer using the Superlab-Pro program. This is a system that generates reaction times studies, and which has the ability to automatically register the answers to the tasks in a matter of milliseconds.

95 pairs of stimuli were considered for each patient: 30 pairs were negative words, 15 related to their traumatic events and 15 unrelated; 30 pairs were positive words; 30 pairs were neutral words; and 5 pairs were formed randomly for familiarization with the task. With the exception of the15 autobiographical pairs listed in Figure 1, which were specific for each participant, the rest of the pairs were the same for everyone and were controlled by the length and frequency of use of the involucrated words.

Autobiographic Negative Words			
Pair	Subject 1	Subject 2	Subject 3
1	Unhappiness-Afraid	Slap-Rancor	Gibe-Afraid
2	Crying-Anger	Pool-Fault	Rebound-Fight
3	Loveless-Loneliness	Sadness-Disinterestedness	Pig-Preoccupied
4	Egoism-Revolting	Horrible-Insult	Fat-Obsession
5	Confusion-Lies	Reprobated-Suicide	Fool-Slaps
6	Pursuit-Sadness	Shame-Humiliated	Ridicule-Inferiority
7	Birthday-Grief	Submission-Painful	Controller-Vengeance
8	Rancor-Apathy	Grief-Afraid	Vengeance-Sickness
9	Sadness-Anguish	Aversion-Deception	Injustice-Stone
10	Grief-Sorrow	Loneliness-Disinterest	Weakness-Distrust
11	Deceit-Rebound	Irritation-Anger	Anger-Blow
12	Unsatisfied-Frustration	Insult-Fear	Obsession-Fat
13	Lifelessness-Frustration	Hate-Powerless	Inequality-Vengeance
14	Anguish-Egoism	Nuisance-Injury	Manipulator-Fool
15	Lies-Confusion	Dead-Uncontrolled	Slap-Pig

Table 1. Groups of negative words related to each participant's traumatic events

Procedure

Three moments were defined to carry out the emotional valence identification studies to each participant, and they were: 1) after the initial interview and before the therapy sessions; 2) in the middle of the treatment; and 3) when the therapy process concluded. These moments became the three phases considered for the analysis of the impact of the therapy.

During each of them, the participant was sat in front of a computer which registered his or her answers to the experimental task that consisted of: the instructions, familiarization with the task to avoid practice effects and the study itself. This study was developed as is described:

- The participant was asked to stare at a dot in the center of the screen where two words appeared afterwards. It disappeared after the patient pressed a key.
- The first word was presented. It stayed on the screen for 250 milliseconds to be read in silence.

- After 50 milliseconds without anything on the screen, the second word appeared and the participant had to decide whether it had an emotional connotation or not by pressing the appropriate key. When this verbal stimulus disappeared, the initial dot appeared again to repeat the sequence.

    When a practice of 5 trials was concluded, the task consisted of 90 experimental trials that were completed in approximately 15 minutes.

Results

With positive and neutral words, only the correct responses during the experimental task were considered. This criterion was not used with the negative stimuli, since the pathology can induce a margin of error with this valence. The resulted data was submitted to a ANOVA (3 x 4) of repeated measures design where the first factor (therapy) consisted of three phases (initial, middle and final) and the second factor (2nd word of each pair) consisted of four experimental conditions (neutral, positive, autobiographical negative and non-autobiographical negative).

The impact of the EMDR therapy is analyzed on different emotional architectures. That is the reason because the results are presented subject by subject.

Subject 1

This participant was diagnosed with moderate depression. She processed all the valences that were included in the different experimental conditions showing interference in her emotional information processing in general. However, through the reaction times from the first study, Figure 2 shows a tendency to use more cognitive resources with the unrelated negative stimuli.

The second and third studies, which were carried out respectively in the middle and in the final moments of the therapeutic process, showed the impact therapy had on the patient's way of coding negative valences. The patient ultimately eliminated them by implementing a cognitive filter. The studies also showed a tendency to easily identify positive information.
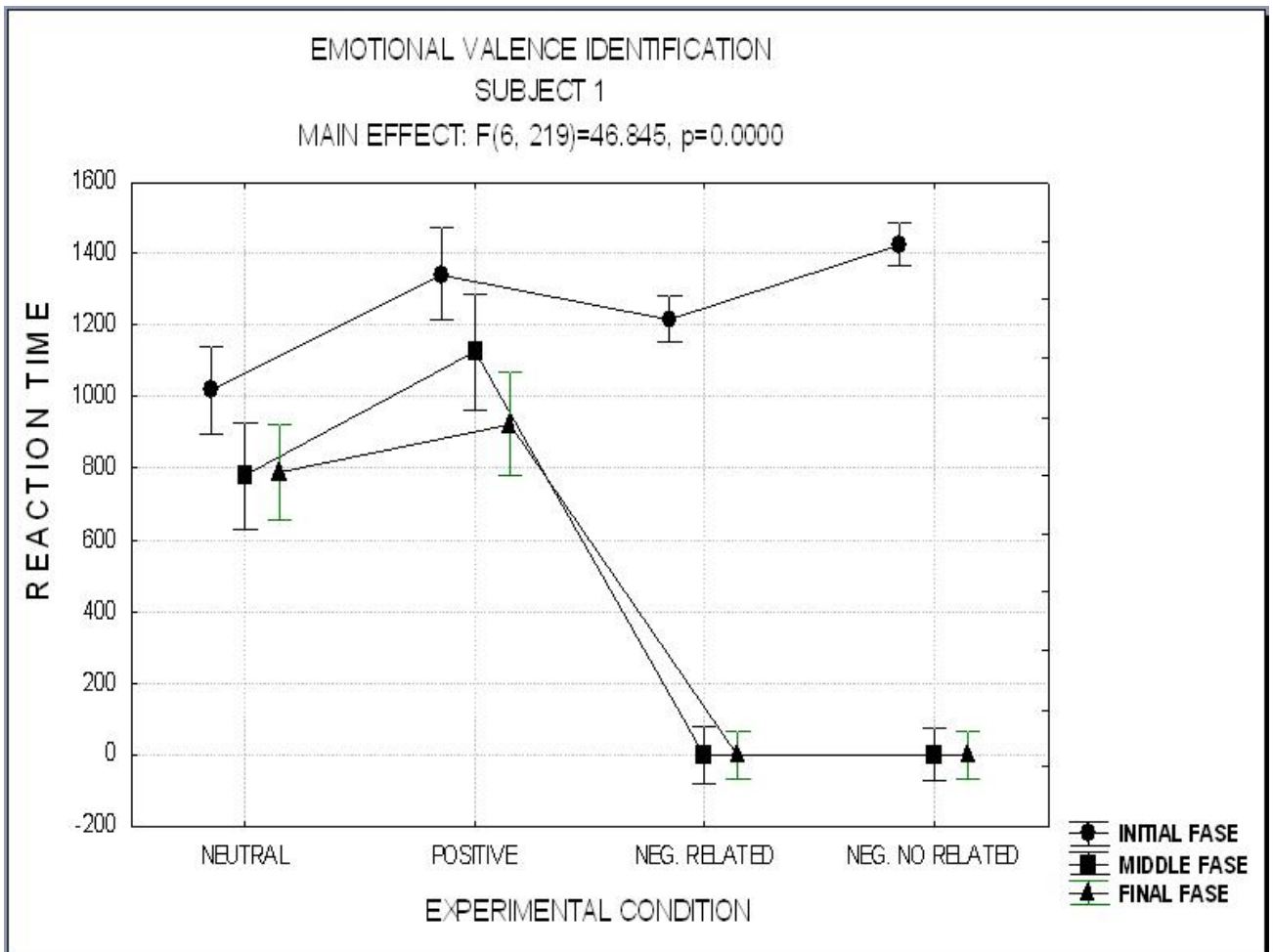
Graphic 1. It shows that therapy based on EMDR methodology had an impact
on the patient by generating a filter on negative information and a
tendency to the positive information identification. The participant
omitted the negative word recognition as a consequence of the
therapeutic process.

Subject 2

This participant was diagnosed with minimal depression, and their initial reaction times prior to treatment showed the bias to facilitate the positive words recognition. Therefore it was expected that negative valence stimuli would not consume much of the cognitive resources, which was confirmed with the fact that such words tended to be processed faster than the neutral ones, as it is shown in Figure 3. In this patient, like in subject 1, it was interesting that she eliminated the recognition of negative words related to her traumatic experiences by implementing a cognitive filter. She also showed an increase on the tendency to facilitate the positive information identification and put more effort in analyzing non-autobiographical negative valence stimuli.
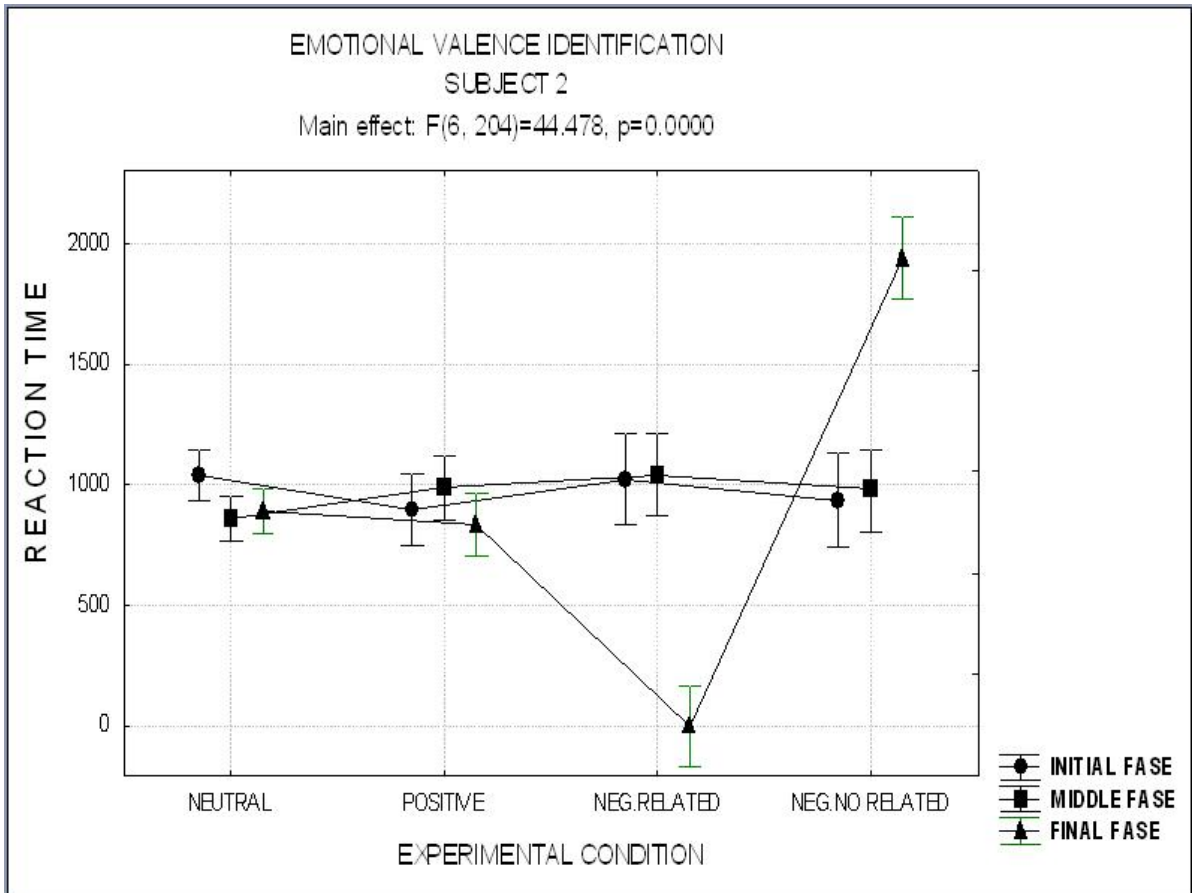
Graphic 2. Data show how the EMDR therapy had an impact on the patient who used a cognitive filter on autobiographical negative information an increased the tendency to facilitate the recognition of positive valence stimuli.

Subject 3

The third participant, diagnosed with mild depression, presented dysfunctional rumination. This suggested a great use of cognitive resources on general negative information, which was confirmed with the high performance latencies from the first study. They are shown on Figure 4 along with the reaction times of

the other two studies carried out at the middle and final of the therapeutic process. According with the graphic the effect of the EMDR therapy on latencies in negative information recognizing was significant, since in the final phase rumination was eliminated. This patient, like the other two, also increased his tendency to facilitate the positive information identification.
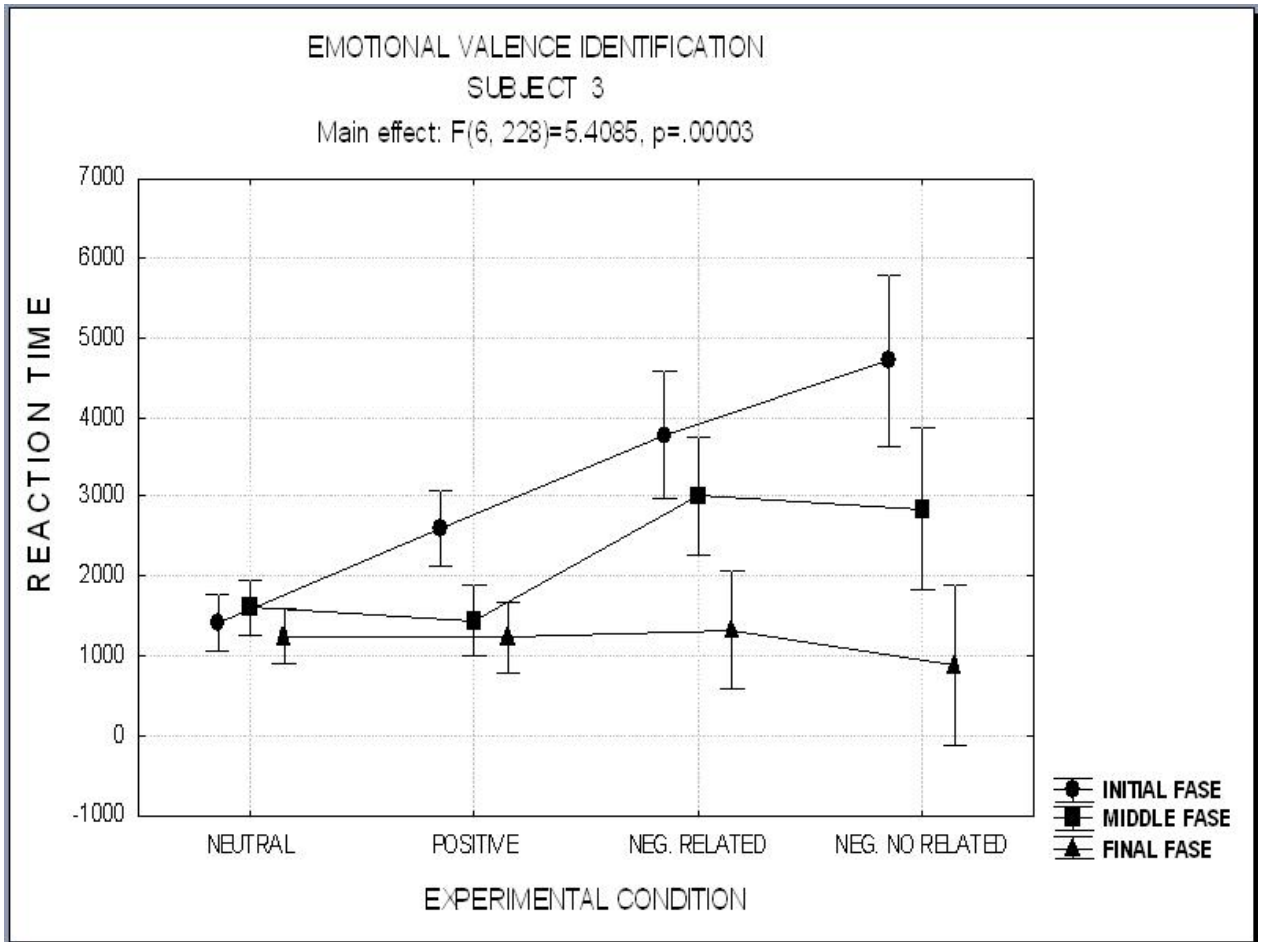
Graphic 3. This illustrates the cognitive resources used in the negative information recognition during the three moments in which the emotional valence identification studies took place. In the final phase, rumination disappeared and the tendency to facilitate the positive information recognition increased.

Discussion and Conclusion

According to the objective of this study to observe the impact of the EMDR therapeutic methodology on the bias mechanisms in the negative emotional valence evaluation, the results indicated that it generated important cognitive-emotional changes in such mechanisms. Although each patient showed a different emotional architecture at the beginning of the study, during the final phase pertaining their reaction times a constant can be observed:

- Change was significant when processing negative information, so that patients 1 and 2 even implemented a cognitive filter to eliminate autobiographical negative words recognition.

Given that constant, the hypothesis was confirmed. A person suffering depression who received EMDR therapy develops changes in the negative valence evaluation of emotional information, hence recovering from it. Additionally, reaction times decreased in the neutral and positive stimuli processing.

From the EMDR therapy perspective, it was hoped that the negative images, beliefs, emotions and sensations that composed the memories surrounding the patient's traumatic events would become less vivid or disturbing, creating a link

to more appropriate information, and it actually happened. The participants learned what was necessary and useful from the negative experiences and reinserted them to their memory in an adaptive and healthy way. At the same time they restructured their self-reference beliefs. The evaluation of this process of recovery was made through measuring units considered in the same standard procedure of the therapeutic methodology. However, results in this evaluation, which patient do on a conscious level, seem to have been confirmed with the results of the investigation in the emotional valence identification studies. Changes that occurred on an unconscious level in the bias mechanisms in the negative valence evaluation, besides facilitating the positive valence stimuli recognition, give a foundation to the recovery achieved.

A relevant implication of the observations which were made can be pointed out. Despite the different emotional architecture of each patient, there were significant changes in the information processing in favor of recovery from depression. Even in subject 3, whom presented rumination, a significant impact could be seen in a decrease on the use of cognitive resources during middle and final phases. Therefore, the objective of achieving changes in the bias mechanisms in the negative valence evaluation of individuals through therapy, so that their events of life in their adjustment process can be correctly monitored, was correctly attended by the interest of EMDR methodology. This interest is to obtain the most profound and integrated effects of treatment in the least amount of time and in harmony with the patient surrounding.

It is important to mention that the fact that subject 1 developed a cognitive filter to eliminate not only autobiographical but non-autobiographical negative information, as was observed in their valence identification studies, might seem undesirable. Such an effect might not allow the patient to use negative information when it is needed for making a choice, solving a problem or making a value judgment. However, what might be considered as an undesired consequence related to the recovery from depression, can be counteracted with the installation phase of this therapy, which increases the force of correct cognitions linked to the original traumatic events, as well as the three slopes standard protocol, which helps to work beyond the patient's past events, also the current ones that may trigger disturbance and the future scenarios. Positive changes reported by this patient and the new evaluation using Beck Depression Inventory confirmed the correct impact of therapy in her daily life. It is important to consider that scientific research has demonstrated that the EMDR methodology is highly effectiveness EMDR. Since its beginnings nineteen years ago, many rigorously controlled studies that offer proof of it have been published (Feske, 1998; Maxfield y Hyer , 2002; Spector y Read, 1999; Van Etten y Taylor, 1998; Carlson et. al., 1998; Ironson et. al., 2002; Marcus et. al.,1997; y Rothbaum, 1997).

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