

## Special Article - Psychopathology in Older Adults

# PTSD and EMDR Therapy: Adaptive Information Processing Typologies

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## Abstract

Eye Movement Desensitization and Reprocessing (EMDR), developed by Francine Shapiro, is a therapy which is intended to treat Post Traumatic Stress Disorder (PTSD) (1 to 10% of the general population). The technique consists of either eye movements following side-to-side movements of the index and middle finger, or the alternate tapping of the hands on the knees. In the course of this therapy, traumatic memories get less intense and their content seems to change. However, the model of Adaptive Information Processing (AIP) - showing therapeutic processes in EMDR - lacks in its theoretical development, thus preventing from a rigorous description of the cognitive processes at stake. Our aim is to deepen this AIP model on a theoretical and practical level.

We consider that the AIP works through 3 types of memory reconsolidation.

1. Associative chain: a memory is linked to other memories
2. Change of scene/ change of perspective: the traumatic scene is visualized through different angles and different colours
3. Archiving: verbalization evokes *storage* metaphors, emotional vividness weakens

**Keywords:** Psychotherapy; EMDR; PTSD; Reprocessing; Adaptive information processing; Reconsolidation

## Introduction

Among the various therapies recommended in the treatment of post-traumatic stress disorder (PTSD), Eye Movement Desensitization and Reprocessing (EMDR) Therapy stands out for its results in terms of efficiency, speed and durability. Independent critics affiliated to the APA (American Psychological Association) classified the EMDR therapy, and exposure therapy, in the list of “empirically validated treatments”. Apart from these, no other therapy has been recognized as empirically based on controlled studies [1]. EMDR, developed by Francine Shapiro, is a therapy which is intended to treat PTSD (1 to 10% of the general population). Since the discovery of EMDR, the same question remains: “How does it work?”. Some theories tempt to answer the question, but just one of them is consensual: EMDR therapy restarts the Adaptive Information Processing (AIP). Shapiro describes the AIP as « a neurological balance in a distinct physiological system which enables the information to be processed in the perspective of an adaptive processing. (...) Useful information is learned and stored with the appropriate affect and is available for future use» [2].

However, the model of Adaptive Information Processing (AIP) - showing therapeutic processes in EMDR - lacks in its theoretical development, thus preventing from a rigorous description of the cognitive processes at stake. Our aim is to deepen theoretically this model and allow us to spot it in clinical expressions. Before we go any further in the explanation on the EMDR functioning with PTSD patients, we will focus on the dysfunctioning elements in PTSD.

The exposition to chronic or acute stress can cause cognitive alterations and psychopathological disorders such as generalized anxiety disorders, major depressive disorder and PTSD [3,4]. According to DSM-5, the behavioral symptoms which are characteristic for PTSD can be categorized into four clusters including negative mood and cognition, avoidance, hyperarousal and re-experiencing of the traumatic event. This exposition can cause an overflowing of mnemonic processes and results in a traumatic autobiographical memory composed of sensory and emotional elements of the original event [5].

PTSD results from excessive and distorted memorisation of a traumatic event: the victims are unable to remember the environment, the context in which the event has occurred, the memories are focused on trivial but nevertheless striking details (a noise for instance). As soon as the detail reappears, they relive the disaster mentally and are terrified even in a harmless environment. Traumatic events trigger a high degree of neuroplasticity, which prevents the patient from disengaging from his reactional symptoms [6]. In other words, instead of learning from stressful events and responding in an adaptive manner to similar demands in the future, the person reacts in an aberrant way to harmless objects reminding him the traumatic scene. When a person is exposed to a violent distressing scene (a child raped by an adult for instance), the mnemonic encoding of this specific event is heavily impacted by his intense emotional and psychophysiological reaction. PTSD has deleterious effects on the memory, the information is stored in an isolated memory network without any connection to other networks that contain neutral or adaptive information [7]. Instead of being an information integrated as a useful experience for

anticipation or adaptation, the traumatic event remains and returns as a constant threat.

To heal from PTSD implies to insert the mnesic network underlying the traumatic memory in the process of synthesis, carried out in the episodic memory endowed with the new status of a bygone and available memory. We consider that the AIP Model described by Shapiro accounts for this mnesic integration. Through our practice, we assisted to effects of EMDR therapy on traumatic memories reported by the patients. It seems that after a completed EMDR session (Desensitization and Installation), the traumatic memory undergoes some modifications that could be directly associated with the processes of mnesic reconsolidation. Reconsolidation is a necessary mechanism for the stabilization and the update of a memory during a labile phase. In the course of this period, memory is susceptible to modification immediately after retrieval [8].

We consider that during EMDR the AIP is achieved by 3 types of memory reconsolidation.

- 1) Associative chain: a memory is linked to other memories
- 2) Change of scene/ change of perspective: the traumatic scene is visualized through different angles and different colours
- 3) Archiving: verbalization evokes *storage* metaphors, emotional vividness weakens

We hypothesize that our AIP typology allows us to support the integration of the traumatic memory in a larger mnesic network during the therapy.

## Method

To spot the AIP during an EMDR session, we elaborated a three clusters typology. In our reports we have only registered the completed sessions (SUD = 0; VOC = 7). We thus made sure to assist successful AIP. In the next section, we are going to expose one specific clinical case according to each cluster. We have selected three patients among fifty to illustrate each category. First, the data have been classed into the appropriate categories. We then chose one case at random as an example for each category.

## Results

### Associative chain (Subject: HG)

HG is a 52 year-old man who decided to start EMDR therapy, neither for a typical PTSD nor according to a medical advice. His aim was to treat his wittmaack ekbom syndrome (restless legs syndrome). Our challenge was to target this complaint, whereas the patient was unable to remember when his syndrome began. We should point out that HG had very few memories of his childhood and his adolescence. After applying the evaluation step of the EMDR standard protocol [9] on this wittmaack ekbom syndrome we started Alternate Bilateral Stimulations (ABSs). We should note that this evaluation step enabled us to link his wittmaack ekbom syndrome with a general feeling of powerlessness. Within the desensitization phase (phase 4), HG remembered other situations of powerlessness. After each set of ABSs, a new memory appeared. For example a climbing accident, the discovery of his wife’s adultery and the announcement of his sterility. We started the therapy from the appearance of his wittmaack ekbom syndrome to the discovery of his sterility. We chose to apply the

**Table 1:** HG evaluation step (1).

<b>HG evaluation step (1)</b>
<b>Event:</b> His first wittmaack ekbom syndrome manifestation
<b>Image<sup>1</sup>:</b> His legs’ shivering
<b>Negative Cognition:</b> “I am powerless”
<b>Positive Cognition:</b> “I am manly”
<b>VOC<sup>2</sup>:</b> 2
<b>Emotion:</b> Shame and sadness
<b>SUD<sup>3</sup>:</b> 8
<b>Bodily sensation:</b> Legs

<sup>1</sup>The therapist asks the patient to select an image that represents the worst moment of the situation

<sup>2</sup>Validity Of Cognition (1 to 7)

<sup>3</sup>Subjective Units of Distress (0 to 10)

**Table 2:** HG evaluation step (2).

<b>HG evaluation step (2)</b>
<b>Event:</b> Thediscovery of his sterility
<b>Image:</b> Masturbation in hospital
<b>Negative Cognition:</b> “I am powerless”
<b>Positive Cognition:</b> “I am manly”
<b>VOC:</b> 1
<b>Emotion:</b> Shame and sadness
<b>SUD:</b> 9
<b>Bodily sensation:</b> Legs and stomach

evaluation phase on this source memory for the next session. We observed an improvement of HG’s health manifested by a decrease of the wittmaack ekbom syndrome and by a correlated increase of sleep durability after three sessions of EMDR therapy (Tables 1 & 2).

### Change of scene/ change of perspective (Subject: DG)

DG is a 29-year-old woman. She has decided to start EMDR therapy after recent traumatic events during her recent life as a mother. Indeed, her child has had convulsions twice. Since the second crisis, DG has developed a Post Traumatic Stress Disorder. She was followed by the recurring memory of this traumatic event. She couldn’t remember neither the start nor the end of the convulsions. She just kept visualizing the image of the convulsions. She said: “I’m watching it as a disarmed spectator”. During the first EMDR session with ABSs, she felt the pain that her child could have endured. However, still in this session, as she tried to consider the situation from her baby’s view, she was able to feel the start and the end of the convulsions. At the end of the session, she could see this scene fade away. In other words, there was a decrease of emotional vividness and DG was able to think of this event without manifestations of PTSD symptoms. She said: “It’s as if there was a screen between me and this scene. I’m still a spectator, but no longer a powerless victim”. We have treated her PTSD within two sessions, one of which with ABSs (Table 3).

### Archiving (Subject: BD)

BD is a 35-year-old woman. She decided to start an EMDR therapy to treat her panic attacks. Preliminary consultations enable us to link her symptoms to several painful situations which appeared in a confused way to the patient. Even though her panic

**Table 3:** DG evaluation step.

<b>DG evaluation step:</b>
<b>Event:</b> Baby's convulsions
<b>Image:</b> Her child who seemed to be dead
<b>Negative Cognition:</b> "I have no control"
<b>Positive Cognition:</b> "I am able to react"
<b>VOC:</b> 1
<b>Emotion:</b> Stress, panic, fear
<b>SUD:</b> 9
<b>Bodily sensation:</b> Stomach

**Table 4:** BD evaluation step.

<b>BD evaluation step:</b>
<b>Event:</b> Miscarriage
<b>Image:</b> Blood loss
<b>Negative Cognition:</b> "I don't deserve happiness"
<b>Positive Cognition:</b> "I deserve happiness"
<b>VOC:</b> 1
<b>Emotion:</b> Sadness
<b>SUD:</b> 8
<b>Bodily sensation:</b> Stomach

attacks disappeared within one session, the therapy lasted for eleven sessions during which several traumatic bereavements were treated. In the course of the last EMDR session with Desensitization (ABSs until SUD = 0 and VOC = 7), she was able to organize her memories in a chronological order. We started with the most recent painful memory and we have gradually been through her history, from her confrontation with death when she was eleven years old, then later when she had to face the death of several family members until the more recent conflicts with her husband. She declared: "I can see these events lining up the one after the other as records, and, the more I see them clearly, the less I feel sad" (Table 4).

## Discussion

Our questioning of the theoretical foundations of the AIP and our clinical observations have led us to elaborate our typology of AIP and its clinical expressions. We know that the AIP represents the tipping point from a dysfunctional to a functional system. For this reason, it is most important to spot the AIP expressions during an EMDR session. We developed this typology from a clinical database and we tested it through the content of the following EMDR sessions. We have stated that the resolution of the trauma takes place generally when this tipping point appears. Our aim is to extract invariants of this tipping point. We have classified these invariants in three categories: associative chain; a change of scene/perspective; archiving.

The Adaptive Information Processing model posits the existence of an information processing system that assimilates new experiences into already existing memory networks. These memory networks impact our perception, attitudes, and behavior in everyday life because perceptions of current situations are automatically linked to associated memory networks [7,10]. When this system of processing is altered by the trauma, the pathology arises in the form of PTSD,

depression, generalized anxiety disorder, phobia, sleep disturbances, etc. It is possible to recover from the trauma and its consequences by restarting the AIP. Our clinical cases illustrate the tipping point from an in adaptive to an adaptive processing.

In HG's case, the EMDR therapy allowed us to link a syndrome with its traumatic origin. During ABSs, the AIP occurs through the reconnection of HG's Negative Cognition (I am powerless) - related to his syndrome - with the first time he felt this Negative Cognition: the day he discovered his sterility. This reconnection induced a decrease of the wittmaack ekbom syndrome, which disappeared after seven EMDR sessions.

Concerning the second case, DG began to change the perspective by putting herself in the position of her baby. In other words, the patient switches from a passive to an active position. This change of perspective enabled her to remember this event as a memory characterized by a beginning and an end. Within one EMDR session, DG was healed from her PTSD.

In the last case, the AIP shows itself through archiving. We should note that it was after having reprocessed every painful event that BD was able to line them up in a chronological order, without being emotionally invaded by the evocation of these memories.

Our AIP typology represents a three-fold challenge. First, being able to notice the AIP triggering during an EMDR session allowed us to know if we are approaching the resolution of the trauma. This tipping point indicates that the pursuit of the ABSs only (there is no need of interventions of the clinician) leads to successful reprocessing of the targeted memory. Second, when the process is blocked, this AIP typology permits to guide the patient according to one of the three categories. Finally, our clinical findings might be indicators of involved mnemonic processes. More precisely, they could represent clinical expressions of reconsolidation at a neurological level.

Except for DG who was diagnosed with PTSD by her Psychiatrist, we can't assert this diagnosis in the other cases. However, EMDR was effective in the retreatment of the traumatic memories. Moreover, we didn't make a test-retest at the beginning and at the end of EMDR treatment through clinical scales in order to get quantitative and objective data concerning the improvement of the symptoms. Future studies, with a greater sample of diagnosed patients, will allow us to evaluate if our typology is generally applicable.

## Conclusion

Since its discovery, the EMDR therapy convinces through its efficiency and it questions about its underlying mechanisms. In this paper, we focused on the Adaptive Information Processing model, the restart of which explains the success of EMDR. Our findings suggest that Adaptive Information Processing works through three modalities: Associative chain, Change of scene/ change of perspective and Archiving. These clinical manifestations might reveal cerebral activities that trigger reconsolidation, a mnemonic process through which the traumatic memories can be modified during episodic recall.

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