



# Adaptive Modelling of Trauma: Development and Recovery of Patients

Daniel Formolo<sup>1</sup> and Laila Van Ments<sup>1</sup> and Jan Treur<sup>1</sup>

<sup>1</sup>Computer Science department, VU University Amsterdam, The Netherlands  
*d.formolo@vu.nl, lailavanments@gmail.com, j.treur@vu.nl*

## Abstract

In this paper, a computational model is presented to simulate traumas, including their development, recovery, and the effect of group support. The model is built upon mechanisms known from cognitive and social neuroscience. Using the model, several scenarios were explored, considering both individual and multiple persons. The simulation results of the model were compared to a data-set on symptoms and recovery of traumatized patients. The obtained model enables simulation and analysis of group therapy and its effects on traumatized patients.

*Keywords:* Computational model, Trauma, PTSD, Hebbian learning, Group support.

## 1 Introduction

After experiencing a traumatic event, most people recover within a few months. However, if this does not happen, a person can develop a condition, possibly diagnosed as Post Traumatic Stress Disorder (PTSD), that strongly affects one's life. During the past decades, post-trauma and PTSD patients have been extensively studied, leading to a better understanding of their symptoms; e.g., (Masten & Narayan, 2012; Parsons & Ressler, 2013; Duvarci & Pare, 2014). A traumatized person can suffer from different symptoms, such as repeated and unwanted re-experiencing of the event (flashbacks), hyperarousal, avoidance of stimuli or thoughts that could remind to the event, and emotional numbing involving loss of body perception (dissociation); all of these lead to unwanted emotional responses.

A concept, which has been known already for a long time but is only recently being studied scientifically, is group therapy for traumatized patients (Litwack et al., 2015). Generally, no significant findings were obtained for group interventions relative to individual treatment comparison conditions, although group therapy did have superior effects relative to a wait list comparison condition. However, some aspects of group therapy can make it a worthwhile investment. First of all, group therapy provides a possibility for often socially isolated patients to develop social relationships in a safe environment, essential for the recovery process of the patient (Foy et al., 2001). Also, group therapy

gives traumatized patients the possibility to identify themselves with others that are in the same situation, making them feel less alone in their suffering and less frustrated about their symptoms. This identification with other patients can have advantages above a therapist that did not go through the same trauma. Finally, group therapy could be more cost effective in situations where staff is limited (Litwack et al., 2015). However, while the presence of other traumatized patients can lead to a feeling of safety and connection, there is also the possibility for individuals to experience other group members as unsafe or a bad influence, which can have counterproductive effects. Therefore, it is important to keep track of all the relations within the support group (Litwack et al., 2015). Alongside the research on traumatized patients and group therapy, a lot of studies have been done on various cognitive emotion regulation strategies within humans. By regulating emotions, individuals can balance how they feel, helping them to maintain a form of emotional homeostasis and have a form of control on their emotional response on certain stimuli. One example of such a strategy is cognitive reappraisal, where an individual reappraises a potentially emotion-eliciting situation in terms that decreases its emotional impact. Using fMRI a parallel was found between this reappraisal and increased activation of the lateral and medial prefrontal regions and decreased activation of the amygdala and medial orbito-frontal cortex, which supports the hypothesis that the prefrontal cortex is involved in constructing reappraisal strategies (Ochsner et al., 2002; Brosch & Sander, 2013). Another strategy for emotion regulation is suppression of the emotional response, without taking away or modifying the triggers for this response. When an individual repeatedly suppresses an unwanted emotion caused by some stimulus, the link between the stimulus and the unwanted emotion will not strengthen much, and the suppression itself leads to a decrease in physiological and experiential aspects of negative emotions (Ochsner & Gross, 2014). Furthermore, (Goldenberg et al., 2015) explains that emotion regulation also exists among groups. Individuals in groups attempt to regulate their emotions in line with specific collective goals, partly based on the individual's self-categorization as a group member, this way the influence of a group defines the way an individual regulates his or her emotions.

In this study, a computational model was developed based on the concepts described above. The model describes processes and developments that happen within a traumatized individual, in particular the (learning of) generation and regulation of emotional responses within that individual, and for the situation that the person participates in (group) therapy. The obtained model could help to create a better understanding of the influence of (group) therapy and other environmental influences on a patient, and how these external factors can help the patient in the recovery process. Also, the model can be a basis for a software application that supports (group) therapy for traumatized patients, helping to overcome the challenges in group therapy that were mentioned above. Finally, the model could be valuable in supporting the growing need for post-traumatic therapy. In Section 2 the computational model is introduced; Section 3 describes various simulated scenarios; and in Section 4 is discussed the model and its results.

## 2 Description of the Computational Model

As discussed in Section 1, a traumatized person can suffer from different symptoms, which can be different for every person. Many factors define the way an individual copes with a traumatic experience: age, gender, past trauma experiences, supportive and protective factors like family and friends, cognitive skills, neurobiological protection, and others (Masten & Narayan, 2012).

### 2.1 Conceptual Representation of the Model

Patients with PTSD can respond to a traumatic event in two ways: by dissociation or by flashback. Each patient usually reacts with only one of these responses. Flashback patients are over-reacting and

Download English Version:

<https://daneshyari.com/en/article/4962312>

Download Persian Version:

<https://daneshyari.com/article/4962312>

[Daneshyari.com](https://daneshyari.com)