

# Fixation & Forgetting: How Trauma Affects Memory Encoding



Bronson Empsall, Tia Sarkar, Jaime Garcia Quile, & Molly S. Hermiller, PhD

## Introduction

- PTSD (Post-Traumatic Stress Disorder) is a clinical disorder developed after experiencing a traumatic event.
  - Can lead to attentional bias and hypervigilance, contributing to anxiety and depression
- Hypervigilance: heightened awareness and responsiveness to ambiguous or neutral stimuli as if they were threatening
- Previous studies:
  - Individuals with PTSD have enhanced threat detection and take longer to detect from threat cues (Lazarov et al., 2019)
  - Increased visual fixations on objects and sweeping eye movements are associated with hypervigilant traits in PTSD (Kimble, Olivia, and Fleming, 2023)
- Differences:
  - Previous studies have utilized still images to measure hypervigilant behavior, we do not know how a participant would interact with naturalistic narratives that have positive or negative conclusions
  - This study primarily focuses on how hypervigilance affects visual fixation on the encoding and recall of naturalistic narratives whether they are “good” or “bad”
- Hypothesis: We expect an increased focus on and recall of negatively resolved narratives and generally more scattered scan fidelity path for people with PTSD

## Current/Prospective Results

- Current Questionnaire Results
  - Individuals with PTSD/Trauma exposed show Higher hypervigilance and background scanning which are negatively correlated with lower Attentional Control Scale (ATTC) scores (not significant, n=18)
  - Hypervigilance positively correlated with cognitive failures (CFQ) (not significant, n=18)
- Prospective
  - Decreased recall ability from PTSD participants compared to trauma exposed or non-trauma exposed participants.
    - Even lower recall ability for those with hypervigilant symptoms.
    - Increased scanpath fidelity (visual recall) for negative information compared to positive
  - Scanpath fidelity should correlate negatively with participants’ Cognitive Failures Questionnaire (CFQ) scores
  - Participants with increased hypervigilance have more scattered fixations and spend more time scanning the exit cues
    - This could affect their cognitive ability to encode the environment and would decrease their recall
- Participants with PTSD will spend less time fixating on the faces in the cartoon sequences, which could affect their ability to replicate the previous eye movements

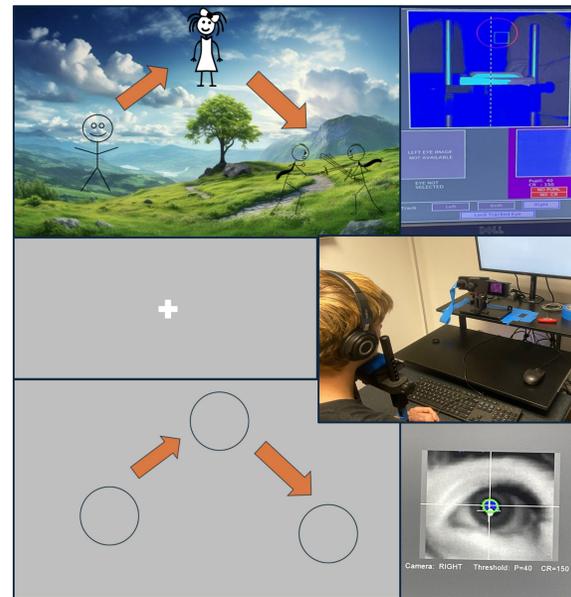


Figure 1. From left to right, top to bottom: 1) 2nd phase of the study 2) SR Eyelink 1000 monitor, 3) fixation cross screen, 4) eye tracking setup 5) 3rd phase sequence scanpath, 6) eye being tracked

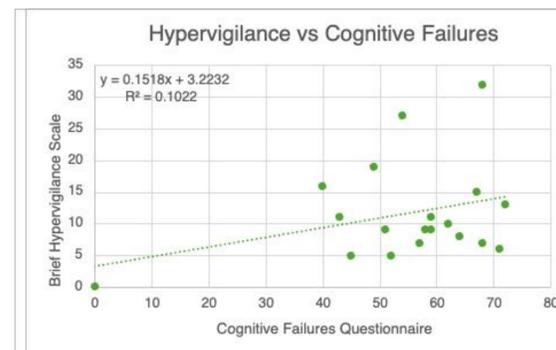


Figure 2. Comparing Brief Hypervigilance Scale (BHS) scores with the Cognitive Failures Questionnaire. There is a weak positive correlation between the two, however, it is not significant (n=18).

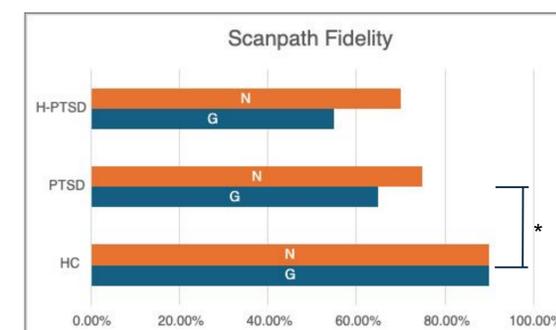


Figure 3. Prospective results comparing the scanpath fidelity of hypervigilance-PTSD, PTSD, and healthy control groups for negative and general recall. It is expected that the recall percentage between PTSD and HC will be significantly different

## Methods

- Mainly FSU undergraduate psychology students ranging from 18-22 years old
- Equipment and Behavioral Test:
  - SR Eyelink 1000 eye tracker to measure visual fixations, eye scanning movements, and the ability to accurately replicate previous eye movements (scanpath fidelity)
- Self-report measures before, during, and immediately after the study
- Experiment: 3 phases
  - 1st Phase: Background images that the participants will rate on a Likert scale of 1 (very negative) to 5 (very positive)
  - 2nd phase: Participants instructed to follow a series of narration over the background images previously shown and asked to watch out for a red screen, in which case they will immediately press a button. The narrations will either end in a positive or negative storyline. Followed by a short break where they fill out a survey on Qualtrics
  - 3rd Phase: Recall phase in which they will be prompted with the final image from different sequences that they just viewed. Then, They are asked to scan between the first two spots with their eyes along with audio cues and then focus on the ending location for the remainder of their time

## Discussion

- Implications
  - A link between hypervigilant symptoms and memory encoding
  - Shows memory bias and general memory deficits with hypervigilant PTSD
    - Negative correlation between ATTC and hypervigilance supports idea of general top-down attention deficits
  - Could be useful knowledge to create tests for neurocognitive improvements in PTSD therapy and/or understanding the cues that trigger patients
  - Can help create personalized treatment reports for PTSD
- Limitations
  - Mainly FSU psychology students - age group is very small (18 - 22)
  - Struggling to find participants that meet the clinical threshold for PTSD
  - Innate memory and attentional deficits could affect results
    - However, we do have a questionnaire on ADHD & Cognitive failures to compare baselines
- Future Work
  - Focus on different age groups
  - See if different traumatic history leads to different results
  - Explore differences in dissociative subtype of PTSD

References & Acknowledgments ->

