



uOttawa

Memory reconsolidation with fear-relevant stimuli and self-reported fear of spiders

Olivia Provost-Walker, Dr. Andrea Ashbaugh, & Julia Marinos
University of Ottawa, School of Psychology

Introduction

- Reconsolidation is the updating of memories during retrieval. Previously, it had been theorized that once a labile memory trace was encoded into long term memory, or consolidated, it was in a static, unchangeable state (Schiller, 2010).
- The possibility of modifying memories after consolidation has tremendous implications for extinction-based therapies in the treatment of specific phobias and post-traumatic stress disorder, both of which have high relapse rates.
- Studies have demonstrated that humans and monkeys alike acquire fears to spiders, snakes, heights and water more readily than to fear-irrelevant stimuli (Mineka & Zinbarg, 2006). This biological preparedness could also influence the transferability of research findings using neutral stimuli.
- Schiller and colleagues (2010) demonstrated that it was possible to reconsolidate fear memories by combining extinction with reactivation using fear-irrelevant stimuli. The current study replicated these behavioural findings using the fear-relevant stimuli of spider images.
- This study sought to examine whether reconsolidation was exhibited in individuals reporting greater fear of spiders, when the material to be reconsolidated was spider related. It is presumed that greater self-reported fear of spiders would be correlated to a higher differential fear response, indicating that reconsolidation did not take place.

Methods

Participant Selection:

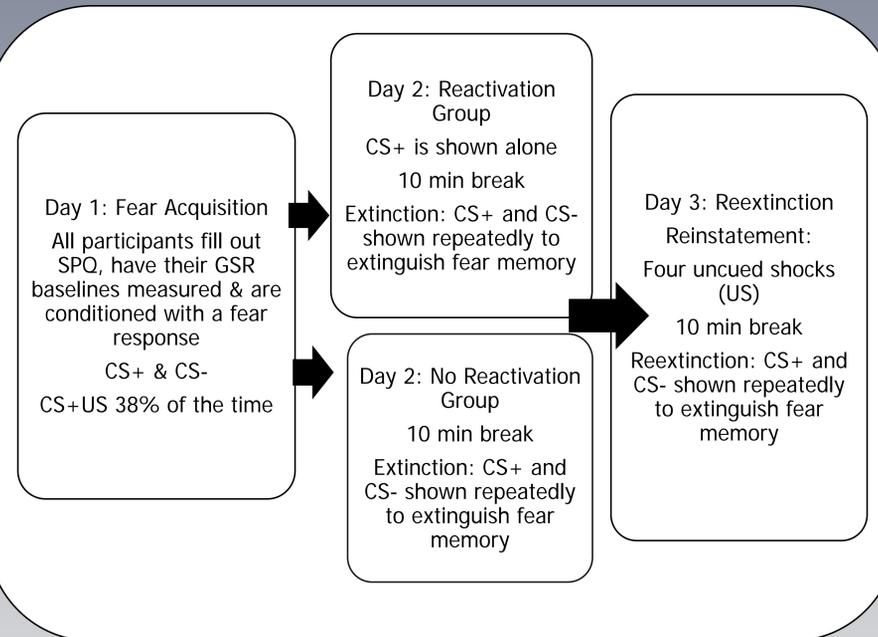
- Participants were nine University of Ottawa students selected via the University's ISPR. Participants received one participant pool credit for the first and second day of the study, and a chance to win one of three Amazon.ca gift cards valued at up to \$100 for the third day of participation. Those with a heart condition, a diagnosis of an anxiety disorder, and those who were currently taking beta-blockers were excluded.

Materials:

- Spider Phobic Questionnaire (Klorman, 1974), a 31-item self-report questionnaire, measuring fear of spiders.
- Galvanic Skin Response (GSR).
- The conditioned stimuli used were two images of spiders, one which was associated with a shock (CS+) and one which was not (CS-). The unconditioned stimulus (US) was a shock delivered by a Grass Medical Instruments Stimulator.

Analysis:

- Differential fear response (DFR) was measured using the difference between the galvanic skin response rating during the first CS+ trial of day 3 and the last CS- trial of day 2. One-tailed correlational analysis was performed to see if the SPQ was positively correlated with differential fear response.



Results

No Reactivation

- N = 3
- Mean SPQ = 11.67
- Mean DFR = 0.07
- R = 0.374, p=0.378
- R² = 0.140

Reactivation

- N = 6
- Mean SPQ = 13.17
- Mean DFR = 0.53
- R = -0.372, p=0.234
- R² = 0.138

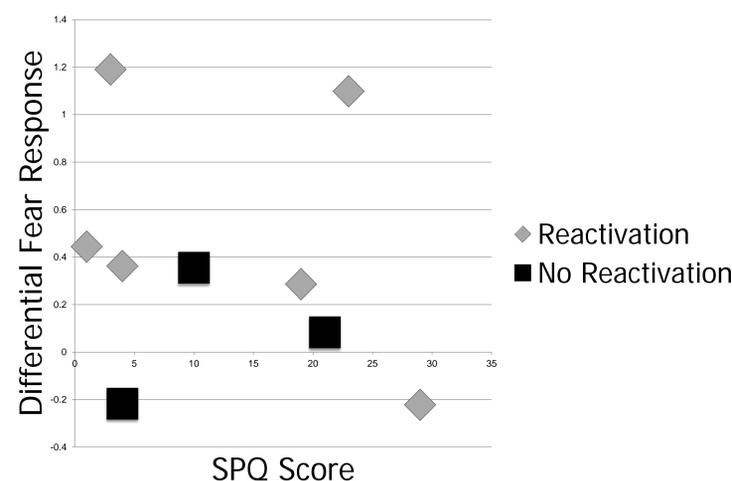


Figure 1. Differential fear response plotted against SPQ score for reactivation and no reactivation groups

- The hypothesis being tested was that greater self-reported fear of spiders, as demonstrated in the SPQ score, would be correlated to a higher differential fear response. This was examined using Pearson's R correlation coefficient, which estimated the relationship between the two variables.
- No significant relationship was found between the self-reported fear of spiders and the differential fear response in the No Reactivation group, $r(3) = .0374$, n.s. A weak positive relationship is observed, $r^2(3) = 0.140$
- No significant relationship was found between the self-reported fear of spiders and the differential fear response in the Reactivation group, $r(6) = -0.372$, n.s. A weak negative relationship is observed, $r^2(6) = 0.138$

Discussion

- The current study sought to identify whether reconsolidation for spider related stimuli occurred in individuals with a stronger fear of spiders. There were no significant findings in both the reactivation and no reactivation groups, which is speculated to be due to sample size.
- Although the findings were not statistically significant, they do support the presence of a weak positive relationship between the SPQ score and the differential fear response in the no reactivation group. Those who had a greater self-reported fear of spiders did tend to have a higher differential fear response. This is consistent with previous research on biological preparedness linking fear-relevant stimuli to stronger fear acquisition (Mineka & Zinbarg, 2006).
- Additionally, in the reactivation group a weak negative correlation is observed between the SPQ score and the differential fear response. This finding is non-significant; however it is inconsistent with this study's hypothesis. It is speculated that this may be because reconsolidation took place in those with a greater fear of spiders. This would require further investigation.
- This study was not without limitations, sample size being the largest impairment. Indeed, the small sample size limited the test's ability to pick up on a possible relationship, and thereby decreased the likelihood of finding a significant difference.
- There may have been other variables influencing both SPQ scores and differential fear response, such as trait anxiety and inhibition. High trait anxiety and childhood inhibition may have mediating effects on the acquisition of fear conditioning (Mineka & Zinbarg, 2006).
- Further research should be conducted to see if other fear-relevant stimuli such as snakes and heights deliver different results. In addition, future studies could look at a variety of physiological measures of fear such as heart rate and startle response to see if they converge. Controlling for variables like high trait anxiety and childhood inhibition may also be of interest.

References & Acknowledgements

- Klorman, R., Weerts, T., Hastings, J., Melamed, B., & Lang, P. (1974). Psychometric description of some specific-fear questionnaires. *Behavior Therapy*, 5(3), 401-409.
- Mineka, S., & Zinbarg, R. (2006). A contemporary learning theory perspective on the etiology of anxiety disorders: It's not what you thought it was. *American Psychologist*, 61(1), 10-26.
- Nader, K. (2013). The Discovery of Memory Reconsolidation. In *Memory reconsolidation* (pp. 1-13). London: Academic Press.
- Schiller, D., Monfils, M., Raio, C., Johnson, D., Ledoux, J., & Phelps, E. (2010). Preventing the return of fear in humans using reconsolidation update mechanisms. *Nature*, 463, 49-53.
- Thank you to UROP, the Office of Undergraduate Research, Dr. Andrea Ashbaugh, Julia Marinos, Stacy MacGregor Dennique and Elizabeth Jannette Smith