

# Evaluating the effects of Counterconditioning, Novelty-Facilitated, and Standard Extinction on the spontaneous recovery of threat expectancy and conditioned stimulus valence: A research plan.

María J. Quintero<sup>1</sup>, Joaquín Morís<sup>2</sup>,  
& Francisco J. López<sup>1</sup>  
<sup>1</sup>University of Málaga, Spain, <sup>2</sup>University of Granada, Spain



## 1. Introduction

Several studies have suggested that **emotional aspects related to the CS valence are a key factor involved in the return of fear**. After a fear conditioning phase, individuals not only learn the contingency relation between the CS and the US (threat expectancy learning), but the CS also gains negative features after being paired with an aversive event (evaluative learning). A later standard extinction treatment in which the CS is presented alone may reduce threat expectancies, but the negative valence newly acquired by the CS can stay intact, which could explain the return of fear [1].

**Counterconditioning** could be a more effective technique to prevent or reduce relapse since it involves the presentation of the CS along with a US of a positive valence [2]. However, counterconditioning could be also promoting a stronger extinction learning due to a greater level of surprise. In order to discard whether the potential benefits of this technique are based on the changes experimented by the CS valence or an enhanced extinction learning, we would consider a third treatment, namely, **novelty-facilitated extinction** [3]. This novel technique is identical to counterconditioning except that the former requires the presentation of a novel stimulus of neutral valence.

The **main aim** of our study is to evaluate whether a counterconditioning treatment is more beneficial than standard extinction to prevent a particular form of return of fear, spontaneous recovery, using a human fear conditioning paradigm. We will contrast the effects of counterconditioning with those derived from a novelty-facilitated extinction condition to evaluate the specific role of the valence changes in the potential benefits of the counterconditioning treatment. Additionally, we will explore the potential relation between self-reported intolerance of uncertainty and spontaneous recovery.

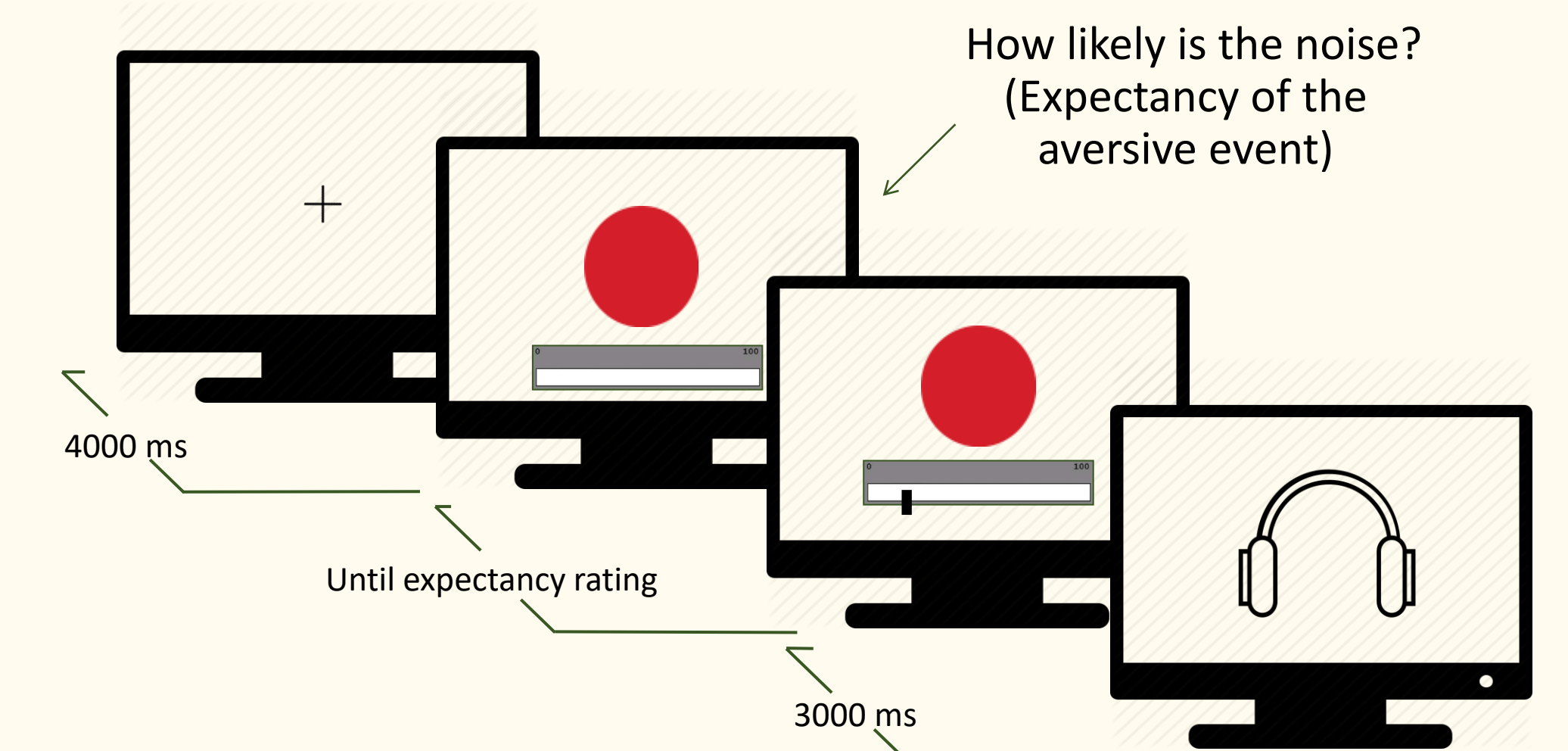
## 2. How will we do it?

### 2.1. Design

	Acquisition	Intervention	Test
Counterconditioning		32 x A (100% $US_{pos}$ ) 32 x B (100% $US_{neuB}$ )	
Novelty-facilitated extinction	8 x A (100% $US_{neg}$ )	32 x A (100% $US_{neuA}$ ) 32 x B (100% $US_{neuB}$ )	1 x A (0% $US_{neg}$ ) 1 x B (0% $US_{neuB}$ )
	8 x B (100% $US_{neuB}$ )		
Standard extinction		32 x A (0% $US_{neg}$ ) 32 x B (100% $US_{neuB}$ )	

24-hour retention interval

### 2.2. Trial schema



## 3. Measures

### Stimuli:

- The negative US will be an aversive 90±5 dB sound previously used in our lab [4].
- The positive and neutral USs will be three 90±5 dB sounds extracted from the IADS-E database [5].

### Measures:

- *Online  $US_{neg}$  expectancy ratings.*
- *CS valence ratings* after each phase.
- *The Spanish Adaptation of the Intolerance of Uncertainty Scale.*
- *The Spanish adaptation of the trait subscale of the State Trait Anxiety Inventory, Form Y.*

## 4. Proposed analyses and expected results

### Threat expectancy and valence ratings

The critical tests will be two one-tailed *t*-tests comparing the magnitude of spontaneous recovery in the different groups.

- Prediction: Counterconditioning < Novelty-facilitated < Standard extinction

### Correlations

An exploratory hierarchical regression analysis to assess the potential relation between self-reported intolerance of uncertainty and the spontaneous recovery effect, controlling for the self-reported trait anxiety measure.

- Prediction: Positive correlation between the level of spontaneous recovery and self-reported intolerance of uncertainty on the Standard extinction group, but not on the Counterconditioning or the Novelty-facilitated groups.

A bivariate correlation analysis between CS A valence (Intervention and Test) and the return of threat expectancies.

- Prediction: Positive correlation between valence ratings and expectancy ratings.

## References

- [1] Zbozinek, T. D., Hermans, D., Prenoveau, J. M., Liao, B. & Craske, M. G. (2015). Post-extinction conditional stimulus valence predicts reinstatement fear: Relevance for long-term outcomes of exposure therapy. *Cognition and Emotion*, 29(4), 654–667.
- [2] Baeyens, F., Crombez, G., Van den Bergh, O., & Eelen, P. (1988). Once in contact always in contact: Evaluative conditioning is resistant to extinction. *Advances in Behaviour Research and Therapy*, 10(4), 179–199.
- [3] Dunsmoor, J. E., Campese, V. D., Ceceli, A. O., LeDoux, J. E., & Phelps, E. A. (2015). Novelty-facilitated extinction: providing a novel outcome in place of an expected threat diminishes recovery of defensive responses. *Biological Psychiatry*, 78(3), 203–209.
- [4] Flores, A., López, F. J., Vervliet, B., & Cobos, P. L. (2018). Intolerance of uncertainty as a vulnerability factor for excessive and inflexible avoidance behavior. *Behaviour Research and Therapy*, 104, 34–43.
- [5] Yang, W., Makita, K., Nakao, T., Kanayama, N., Machizawa, M. G., Sasaoka, T., ... Miyatani, M. (2018). Affective auditory stimulus database: An expanded version of the International Affective Digitized Sounds (IADS-E). *Behavior Research Methods*, 1–15.

## Want to know more?



[marijo959@hotmail.com](mailto:marijo959@hotmail.com)  
[joaquin.moris@gmail.com](mailto:joaquin.moris@gmail.com)  
[frjlopez@uma.es](mailto:frjlopez@uma.es)



@MJQuintero29  
@joaquinmoris



<https://www.uma.es/causal-cognition-group/info/101529/presentacion/>