Continuous and partial reinforcement impact threat expectancies in conceptual fear generalization

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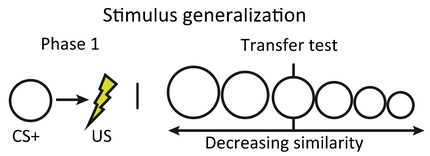
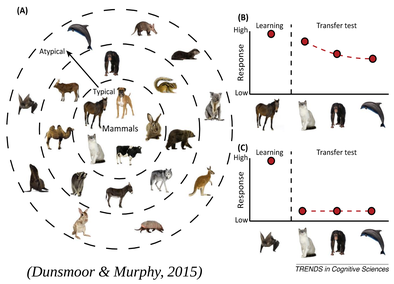
Introduction

- In threatening situations, humans generalize fear from one situation to another similar situation.
- The interpretation of an event and the ability to generalize threat is based on the **similarity between the two events**.



(Dunsmoor & Murphy, 2015)

- In Fear Generalization, conditioned fear responses are observed for **novel stimuli which share perceptually or conceptually similar properties** with the conditioned stimulus.

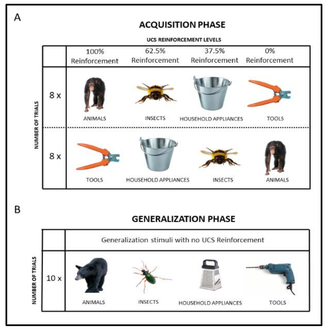


(Dunsmoor & Murphy, 2015)

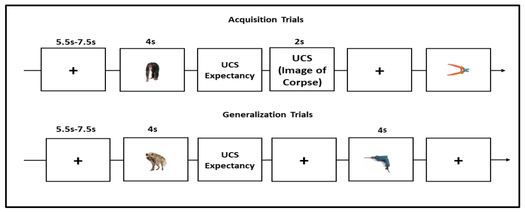
- Fear generalization also depends on the **intensity and certainty of the occurrence** of the threat-related stimulus.
- Partial and continuous reinforcement of the conditioned stimuli impacts the generalized fear responses and the development of cognitive biases.
- In category-based conditioning, individuals were conditioned to **members of a category rather than a single stimulus**. Later, individuals were tested with other members of the same category with which they had never been conditioned.
- In the current study, we seek to explore the effect of levels of UCS reinforcement on conceptual fear generalization due to category-based similarity using a visual UCS.

Method

- **Thirty** healthy undergraduate students aged between 18 - 21 years [26 males (M = 19.16, SD = 0.75) and 4 females (M= 19.6, SD= 0.55)] were recruited as participants.
- A **within-subject design** with a **category-based fear conditioning paradigm** was used.
- Exemplars from four categories (denoted as CAT), **animals, insects, household appliances, and mechanical tools** were used as conditioned stimuli.
- The unconditioned stimulus was an **aversive image** selected from the International Affective Picture System (IAPS).
- The experiment comprised two phases: **Acquisition and Generalization**.
- In the acquisition phase, exemplars from the four stimulus categories were presented with **varying levels of UCS reinforcement**.
- In the generalization phase, **new exemplars** from each category was presented without reinforcement.



Experimental procedure. A. In the acquisition phase, CAT1+ received 100% reinforcement, CAT2+ received 62.5% reinforcement, CAT3+ received 37.5% reinforcement, and CAT- was never reinforced. The dotted line represents counterbalancing of the CAT+ and CAT- categories across participants.



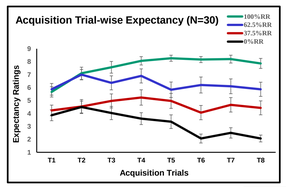
Experimental trials. The CAT+ was presented for 4 seconds, followed by the UCS with varying reinforcement levels for 2 seconds. The CAT- was presented for 4 seconds without the UCS. A jittered intertrial interval ranging between 5.5 seconds to 7.5 seconds preceded each trial.

Analysis

- A one-way repeated measures ANOVA was performed with **reinforcement level** (37.5%, 62.5% and 100%) as the **within-subject factor**.
- We compare their effect on the differential UCS expectancy ratings in the Acquisition and Generalization Phases.
- For the acquisition phase we calculated the mean expectancy ratings from **trial 2 to trial 8**.
- Trial 1 was eliminated due to orientation response.
- For the generalization phase we calculated the mean expectancy ratings from trial 1 to trial 10.

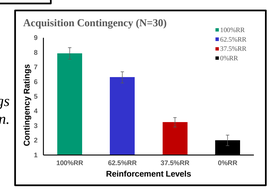
Results

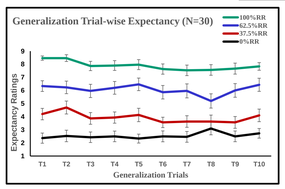
- A significant difference in the differential UCS expectancy ratings in the Acquisition phase [F (1.65, 47.94) = 24.76, p < 0.001), ηp2 = 0.461]
- A significant difference in the differential UCS expectancy ratings during the Generalization phase [F (1.13, 32.88) = 36.03, p < 0.001), ηp2= 0.554].



Trial-wise acquisition expectancy ratings

Mean contingency ratings after acquisition.





Trial-wise generalization expectancy ratings.

Discussion

- The UCS expectancy ratings reflected that conditioned fear generalized to conceptually similar stimuli with a **direct effect of UCS reinforcement**.
- Expectancy ratings increased with **increasing certainty of UCS occurrence**.
- In the continuous (100%) reinforcement category, the highest differential UCS expectancy was observed, followed by the 62.5% reinforcement category, and the 37.5% reinforcement category.
- The generalization phase reflected that the participants' differential expectancy ratings were based on **the predictive relationship between the CS-UCS learned during the acquisition phase**.
- **UCS expectancies did not decline over the generalization trials even due to the absence of UCS presentation**.
- Using multiple exemplars from each category during acquisition, and multiple novel exemplars during generalization may have resulted **in stronger conditioning to the category cues**.
- Stronger conditioning may have resulted in the **sustained conditioned responses** to novel exemplars of those categories during generalization, based on the CS-UCS reinforcement level.
- Our results may help to understand how fear generalizes to conceptually related stimuli based on the certainty of the UCS occurrence.
- Furthermore, our findings may help to understand how fear generalizes using **less noxious stimuli** (visual) as the UCS.

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References

My CV