

## SOCIAL CONTEXT-, EXPERIENCE-, AND AFFECTIVE STATE-DEPENDENT PROSOCIAL BEHAVIOR IN RATS: A MACRO- AND MICRO- ANALYTIC INVESTIGATION

Friday, August 4th, 2023

10:00 am - 12:00 pm

Location: CSB 003 or Join with [Zoom](#)

### Abstract

Prosocial behaviors, behaviors that benefit others, are present in various forms across a range of species. While rats have been shown to exhibit multiple prosocial behaviors, few studies have investigated the influence of the social context on prosocial behavior or explored the micro behaviors that predict helping. The work in this dissertation employs a novel experimental environment to study how rats respond to each other's "neediness," change their behavior based on levels of familiarity, modify their helping depending on the stress in the environment, and reciprocate help (or not) across different social contexts.

The first chapter investigates whether rats' willingness to release a trapped conspecific from an enclosure is influenced by the trapped rat's level of neediness, defined by the experimentally-imposed stressors and the rats' expression of distress. Frame-by-frame video analysis revealed the complex interplay between the trapped rat's distress, the free rat's state, and the temporal dynamics of their behaviors in predicting helping behavior. Surprisingly, free rats were less likely to help a partner demonstrating higher levels of distress. Instead, the free rats frequently engaged in safety monitoring and escape behaviors, indicating a shift away from helping that was likely triggered by the trapped rat's distress. The data suggests that rats' lack of helping was not due to apathy; instead, the problem may have been over-arousal.

The second chapter investigates whether familiarity, defined by the strain of the trapped rats, and neediness, defined by the experimentally-imposed stressors, influences rats' propensity to release trapped conspecifics in a triadic helping environment. The level of need and familiarity of two trapped social partners was systematically manipulated across conditions, and a third rat, the free rat, could help one, both, or neither social partner. The rats showed the highest level of helping when the number of imposed stressors was the lowest and the lowest level of helping when the number of stressors was the highest. The results corroborate the findings in the first chapter and show that rats' overall helping behavior changes based on the stressors experimentally-imposed on the trapped rats. In both studies, each rat's distress likely was compounded by the distress of others, leading to a decreased likelihood of helping when the rats were in heightened states of arousal. In contrast to previous studies, the strain of the trapped rat did not significantly affect rats' prosocial behavior.

The final chapter goes through three separate experiments that explore how rats adapt their helping behavior based on the social context and their partners' previous actions. In triads, rats showed a higher propensity to help a partner that had provided little (or no) help, while in a dyadic context, rats showed the opposite pattern. In dyads, rats exhibited reciprocity, helping partners who had previously been consistently helpful. Interestingly, across both social contexts, a conspecific that repeatedly tried but failed to help was treated similarly to a partner that had repeatedly helped. This suggests that rats alter their reciprocal helping based on the prior helpful actions of others, regardless of whether the goal was achieved. Overall, through different behavioral tasks and the analysis of rats' macro and micro behaviors, this dissertation provides insights into the social context-, experience-, and affective state-dependent prosocial behavior of rats.

### Committee members:

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