

## Good leaders are more helpful, a study in rats say

We usually think of dominant subjects as more aggressive, but this study shows that this is not the case

**July 7, 2022** - Behaviors that benefit others, known as prosocial behaviors, are not exclusive to humans, but are conserved in different species, including rats, given their importance for survival. These altruistic behaviors favor the development of positive social interactions, such as cooperation, which support individual and group well-being.

Several factors modulate prosocial behaviors, including familiarity and social status. In relation to the latter, flexible adaptation of decision making based on social hierarchy may be a crucial survival strategy. However, little is known about the behavioral correlates that promote choices for the benefit of other community members.

The latest work of the Neural Circuits of Social Behavior Laboratory of the UMH-CSIC Neurosciences Institute, led by Dr. Cristina Márquez Vega, evaluates precisely this question. They have discovered that social hierarchy is a fundamental modulator of prosocial behaviors, while sex or the degree of familiarity is not.

It is especially striking that "altruistic" choices by individuals who occupy the highest positions in the social hierarchy (dominants), are driven by their subordinates, which approach their leaders and increase affiliative vocalizations when the chances to get help was low.

This multimodal communication by the submissive animals signals their needs, attracts the attention of the leaders, and promote prosocial behaviors by the dominant rats. They also observed that body language is a fundamental feedback that allows leaders to learn the effect that their actions have on their subordinates.

The work led by Marquez provides a better understanding of the behavioral dynamics that influence leaders' action selection following the perception of socially relevant cues.

### SOCIAL DECISION MAKING

"With this work, we have assessed how laboratory rats adapt their decision to help or not to help depending on the social context and identified how animals incorporate the actions of others in social decision making," explains Cristina Márquez, who led the study, whose first author is Michael Gachomba.

To address this question, the researchers used a two-choice task in which rats can either provide rewards to a conspecific in the absence of self-benefit or behave selfishly, and assessed which conditions promote prosociality by manipulating the animals' social context.

In previous work, Márquez's team had shown that male rats behave prosocially by providing food to a known conspecific in the absence of self-benefit, and that the foraging behavior displayed by those in need of help is necessary for prosociality to emerge. In this new work published today, the researchers used the same task to find out what factors promote or hinder prosociality by modulating the familiarity, sex, and social status of the interacting animals.

They hypothesized that social interactions prior to choice might be crucial in increasing the social relevance of recipient individuals' attempts to reach for food, and thus such behavior might prompt leaders to understand that their choices have an impact on others.

To this end, "we first identified the social conditions in which differences in prosociality can be detected and then conducted a refined analysis of the observed social interactions," says Gachomba. "We wanted to understand why there are individuals who help others more, or that do not help. It was an important question that was still unanswered," explains Joan Esteve-Agraz, also an author on the study.

Thus they have shown that, as has been observed in non-human primates, dominant male rats are more prosocial, with a faster onset of prosocial actions. "Beyond the description of this effect, we unraveled the behavioral correlates that cause it based on the analysis of social interactions," clarifies Cristina Márquez.

"Interestingly, we have seen that the higher levels of prosociality of dominants or leaders are a consequence of the fact that their submissive peers are better at communicating their needs and, therefore, are able to modify the dominant's behavior. This interesting effect emerges in the form of multimodal social dynamics and highlights the importance of taking into account the bidirectionality of social interactions in decision making."

Gachomba adds, "We usually think of dominant subjects as more aggressive, but in this study we describe that this is not the case, but that they also pay more attention to the needs of others."

In addition, by identifying the behavioral dynamics involved during the helping process, the study will advance research on how the brain and its circuits interpret the actions of

others in social decision making, a complex process that is affected in different social disorders, such as autism spectrum disorders or antisocial personality disorders.

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