

Rats free each other from cages

Altruistic acts raise questions about whether the rodents feel empathy.

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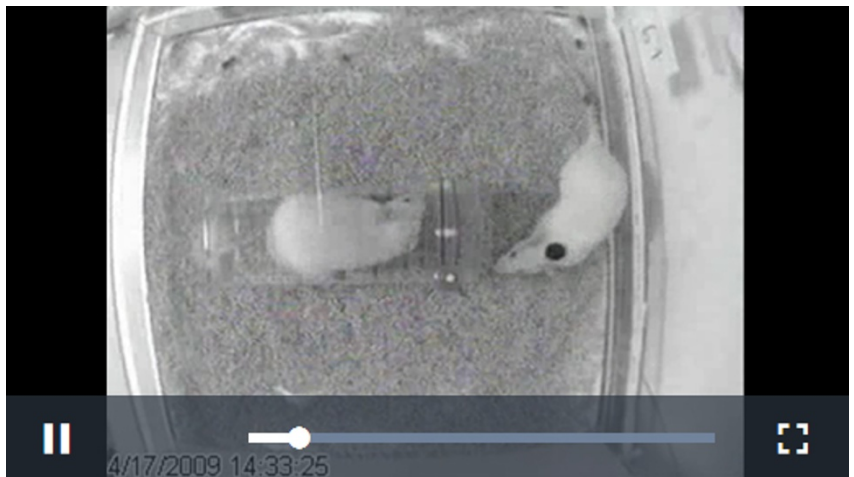
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Rats, often anthropomorphized as greedy and selfish, may not be the callous, cartoon villains they are sometimes made out to be. A paper published today in *Science* demonstrates that the rodents will liberate trapped cage-mates — even when they have nothing to gain¹.

There is a growing body of research showing that animals respond to the emotions of others. But it wasn't certain whether rats could suppress their own distress in order to aid another rat.

Lead author Peggy Mason, a neurobiologist at the University of Chicago, Illinois, thinks her work is a significant step towards settling this question. "This finding is the big kahuna — evidence that empathy motivates one individual to help another," she says.

Following a two-week introduction period, pairs of rats were put inside an arena. One was trapped inside a central restrainer, while the other roamed free in the larger space. By day six or seven, on average, the roaming rat learned to free the trapped rat. The free rats seldom opened empty containers or those containing a toy rat.



Emotional contagion

Although fewer in number, all the female rats tested became door openers; whereas 30% of males never became door openers.

When chocolate was introduced to the mix, there was no difference in the time taken to free the trapped cage-mate, despite pitting freeing the trapped cage-mate against getting a tasty treat. Furthermore, the helper rats did not eat all the chocolate chips. Instead, they often allowed the trapped rats to eat some.

"These are robust, convincing findings that rats are actively prosocial," says Jeffrey Mogil, a behavioural neuroscientist at McGill University in Montreal, Canada. In 2006, Mogil and his colleagues showed that mice who watch their cage-mates in pain are more sensitive to pain themselves — an effect dubbed 'emotional contagion'².

These findings will stoke efforts to determine where on an incremental spectrum of empathy various animals fall. From emotional contagion to prosocial behaviour (voluntary acts to help others) to the cognitive empathy (understanding the feelings of others) displayed by humans.

"Finding simple mechanisms in animal brains that make them sensitive to others is exciting because it suggests empathy is deeply engrained in the heritage of animals," says Christian Keysers, head of the Social Brain Lab at the Netherlands Institute for Neuroscience in Amsterdam.

Blurring boundaries

But others say that these findings are much ado about nothing. "This is yet another example of a definitional assault that has the goal of blurring the distinction between cognitive and emotional processes in humans and animals," says Daniel Povinelli, head of the cognitive evolution group at the University of Louisiana at Lafayette.

At issue is the definition of empathy. “This work is not evidence of empathy — defined as the ability to mentally put oneself into another being’s emotional shoes,” says Povinelli. “It’s good evidence for emotional contagion and that animals are motivated to coordinate their behaviour so that distress is reduced, but that is nothing new.”

It is not yet possible to determine whether rats can imagine another individual’s reality, admits Mason. “We show the next step up from emotional contagion — doing something that affects another individual,” she says. The typical response of a distressed rat is to freeze and not move. The rat has to understand that its situation is different from that of the trapped rat, suppress the urge to freeze and realize that it can do something to create a different outcome, she says.

Mason’s broader definition of empathy — sensing and reacting to another’s emotional state — is held by many others in the field, including Gareth Lahvis, a behavioural neuroscientist at Oregon Health & Science University in Portland. “This definition doesn’t require a compassionate response, but this paper demonstrates it is possible,” he says.

True motivation

The real question, says Povinelli, is what is motivating the rats to free their cage-mates. “This paper has no ability to discern if the helper rats are distressed themselves and simply figure out a way to stop the irritation,” he says.

Lahvis agrees that something — for example, an odour or a stress hormone — must trigger the behaviour. But Mason doesn’t know what it is. She hypothesizes that pheromones, tactile interaction between the rats or visual cues may have a role. However, she discounts audible alarm calls, because, she says, the calls occurred too infrequently to account for the behaviour. In some sessions in which rats were freed, for example, there were no alarm calls.

Mason’s team is now conducting follow-up experiments to answer these questions, as well as to work out whether rats will free other rats that they have not spent two weeks getting to know. We “hope that this work will spark a flurry of experiments”, she says.

Lahvis argues that what makes this a controversial issue is, largely, cultural. “We study animals to see what makes us uniquely human, but the findings of empathy in animals often force uncomfortable questions about how humans treat animals,” he says.

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References

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2. Langford, D. J. *et al. Science* **312**, 1967–1970 (2006).