

# For better research results, let mice be mice

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Animal models can serve as gateways for understanding many human communication disorders. Insights into the genetic paths possibly responsible for conditions such as autism and schizophrenia often begin

by studying acoustic behavior in mice.

But a new study from the University at Buffalo suggests that the established practice of socially isolating mice for such purposes might actually make them poor research models for humans, and a simple shift to a more realistic social environment could greatly improve the utility of the future studies.

That's because how mice are raised affects how they hear in the real world, according to Micheal Dent, a professor in UB's Department of Psychology and coauthor of the paper with Laurel Screven, a postdoctoral research fellow at Johns Hopkins, who was a UB graduate student when the research was conducted.

Socialization is critical, according to Dent.

"We need to raise our animals in more naturalistic situations since it turns out that it has an effect on their acoustic communication, including how they hear and how long it takes to train them on a behavioral task," says Dent, an expert in the perception of complex auditory stimuli in birds and mammals.

"Normally when we do these studies, we isolate the animals for their entire lives. This is not a good model for humans because we're creating these odd worlds for the mice. It's not natural. Having the mice live together changes their perception of vocalizations, so clearly it is important."

The findings of the new paper, which appear in the journal *eNeuro*, began as a curiosity Screven expressed to Dent, her dissertation adviser at UB.

Screven was interested in the effects of social experience on acoustic

communication in mice. Previous research demonstrated that when female mice have babies, their neural responses to calls, or ultrasonic vocalizations, change. Their response depended on whether or not the mice had pups. Screven wondered if the social experience of vocalizations somehow changes the composition of the brain, and changes the composition of the auditory areas of the brain..

It was a possibility that had not been previously studied.

"We can't tell what kind of neural effects are taking place from our behavioral research, but what we can say is that we should not be isolating mice," Dent says. "We should put them together in order to create a more realistic situation, one that's more applicable to human communication.

"Knowing how to raise and care for these animals can improve research on human communication," says Dent.

For their study, Dent and Screven first trained mice to poke their noses through one hole to start a repeating [vocalization](#) and then to poke their noses through a different hole when they heard a different vocalization. Mice emit ultrasonic vocalizations (USVs), which vary in frequency, duration and intensity.

The collective differences in these characteristics is the call's "shape." The shapes perceived by the mice are similar to how humans hear different words.

The socially isolated mice required significantly more time to learn to discriminate between the USVs than the socially housed mice, and they used different aspects of the USVs to do it.

"The goal of the research in our lab is to first establish the baseline

acoustic communication behavior of the mice so in the future we can start understanding communication in mice with genetic manipulations," says Dent. "If we look at the genes found in humans who stutter, for instance, or have high frequency hearing loss, or accelerated age-related hearing loss, we can see what happens when we knock out those same genes in the mice.

"Eventually, we can attempt to 'fix' the disorders in mice, leading to possible treatments for humans."

For Dent, the findings are immediately applicable and she says the next step in her research will be to house mice together in future experiments.

"Just the finding that the mice train faster when they live together is important for anyone in my line of research wanting to get the data out faster," says Dent. "But I also think that creating a more natural living situation for the [mice](#) will make the results of these laboratory experiments more relevant for human [communication](#) and studying how humans process vocalizations."

**More information:** Laurel A. Screven et al, Perception of Ultrasonic Vocalizations by Socially Housed and Isolated Mice, *eNeuro* (2019).  
[DOI: 10.1523/ENEURO.0049-19.2019](https://doi.org/10.1523/ENEURO.0049-19.2019)

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