Study finds pandas are more socially active than previously thought

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A giant panda in the Wolong Nature Reserve in China's Szechuan Province checks on recent social postings on a scent-marking tree. Credit: Jindong Zhang

Pandas, long portrayed as solitary beasts, do hang with family and friends—and they're big users of social media. Scent-marking trees serve as a panda version of Facebook.

An article in the journal Ursus paints a new lifestyle picture of the beloved bears in China's Wolong Nature Reserve, a life that's shielded from human eyes because they're shy, rare, and live in densely forested, remote areas. No one really knows how pandas hang, but a new study indicates pandas are around others more than previously thought. They use scent marking to keep track of both family members and friends, leave updates about life events, and check out the dating scene.

Thomas Connor, lead author of the article, did this work for his Ph.D. from Michigan State University's Center for Systems Integration and Sustainability (MSU-CSIS) by spending months hanging out in those forests, watching for signs of pandas, since actual pandas are virtually invisible. His work was built on previous observations by other MSU-CSIS scientists who suspected pandas likely weren't the total loners everyone thought.

"Once you've gotten an eye for it, you can see on ridge tops and different trails the scent-marking trees, which are stained with a waxy substance—and the pandas seem to be doing this a lot," Connor said. "It was pretty evident they were exchanging information through scent marking behavior."

To link the marked trees with an understanding of pandas' social structure, nearby panda communities needed to be documented. To explore that hunch, Connor teamed up with MSU Foundation Professor of Sociometrics Ken Frank, an expert on social networks and a co-author of the article.

The researchers didn't have a camera on a bear every time it sniffs a

tree. "That's a key part," Frank said. "I told him that once he has data on which bears are close to each other we can use the techniques and theories that apply to humans to understand their social networks.

"And these scent trees are a social media. Like Facebook, it's asynchronous, meaning you don't have to be in the same place at the same time. It allows one to broadcast to many, and it's a record. A panda marking a tree isn't so different from a Facebook post."

Poo: A panda portal of social insight

To determine which bears were close to each other, Connor dug into a wealth of data he had collected in the form of fresh panda poop.

Panda scat is the gold standard of panda watching. What pandas lack in obvious sociability they make up for in poop production—going some 90 times a day. That means they leave a reliable trail. Connor was able to extract DNA from the fresh panda poop he and his colleagues collected in a 46 square kilometer area known as prime panda habitat.

Information from the scat allowed them to identify specific pandas in the vicinity of the scent-marking trees, and showed if these pandas were related to each other. That allowed them to combine that with the information from their chosen communication method—the scent trees—to explore their social network.

A giant panda in China's Wolong Nature Reserve rubs scent glands against a tree used by the animals to leave messages about their status. Credit: Jindong Zhang

"We defined two panda individuals within a certain distance from each other as an association, Connor said. "Even if they're not directly communicating or running into each other physically—they can exchange information in the chemical scent signature. That built up the social network for the analysis."

Which was a revelation for an animal thought of as a loner.

Deploying a clique detector to spot social networks

Frank said once they could determine the bears were in proximity, they could apply the social network technique of community or clique detection.

"It's pretty much like high school," Frank said. "And like in high school, cliques have lots of implications. There are strong norms within a clique—and while encountering those outside a clique is rare the information can be very important."

The scent-marking trees are ripe with information, telling the sniffer who the animal is if they'd encountered them before. It also tells the marker's sex, an idea of how dominant and large the bear is, and whether they're ready to mate.

Connor said the most tantalizing information they gleaned is that in non-mating seasons, the pandas seem to be hanging mostly with other family members. But they seemed to branch out in mating seasons—likely using the scent-marking trees as a territory map.

That's an important behavioral change since moving out of the family groups during mating season reduces the changes of inbreeding and competition. Connor noted this result was preliminary and limited by small sample sizes, but a tantalizing one that should be followed up on.

"The discoveries in this study shed new light on how pandas use their habitat," said Jianguo "Jack" Liu, senior author of the article, Rachel Carson Chair in Sustainability, and CSIS director. "Pandas are a part of coupled human and natural systems where humans share their habitat. Anything we can learn about how they live and what they need can ultimately help inform good conservation policies and maybe understand our own behavior a little more.

In addition to Connor (now a postdoctoral fellow at the University of California—Berkeley), Frank and Liu, "Social network analysis uncovers hidden social complexity in giant pandas" was authored by Maiju Qiao, Kim Scribner, Jin Hou, Jindong Zhang, Abbey Wilson, Vanessa Hull and Rengui Li.

More information: Thomas Connor et al, Social network analysis uncovers hidden social complexity in giant pandas, *Ursus* (2023). DOI: 10.2192/URSUS-D-22-00011.1

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