Caribou drone study finds 'enormous variation' within herd

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Dolphin-Union caribou migrating in northern Canada. Credit: Jeff Turner

Herd animals may not be as conformist as we thought, according to new research published in *Philosophical Transactions of the Royal Society B*. The first paper to use drones to record the movement of individual animals within groups, it is also among the first to study social interactions within those groups as they migrate.

Andrew Berdahl of the Santa Fe Institute, his long-time collaborator Colin Torney of the University of Glasgow, and their co-authors used drones to collect overhead footage of caribou migrating to and from mainland Canada and Victoria Island. Then they extracted trajectories of each individual caribou and used those trajectories to quantify how social influence impacts fine-scale movement patterns within the herd.

"New technologies, like the drones and computer vision we used in our study, are really exciting because they give us the ability to collect movement data on every single individual in a group simultaneously," says Berdahl. "That means we can now unravel the important role that social interactions play in guiding migratory movements."

Until recently, scientists could only study animal migration by tracking a small subset of individuals through GPS collars. As a result most studies don't capture the dynamics between individuals, despite the fact that so many migratory animals travel in groups.

The authors' findings call into question one classic assumption in the field of collective behavior: that individuals within a herd all behave similarly. "We found enormous variation in sociality across sexes and age classes," says Berdahl. "For instance, calves are highly social while adult bulls tend to be much more independent."

The study also shows that caribou follow highly isotropic interaction rules—that is, they are more influenced by herd members in front of them than by those beside them. "This leads to asymmetric information flow through the herd and, interestingly, agrees with the traditional knowledge of the Inuit, which states that a subset of 'lead' caribou effectively guide the path of the annual migration," says Berdahl.

"Ultimately, collective behavior is important because social dynamics can have population-level implications," write the authors. The

framework they lay out could be used to explore individual and collective movement in a wide variety of animals and environments.

Provided by Santa Fe Institute