Can animals use iridescent colors to communicate?

November 19 2020

Anna's humming bird (Calypte anna) showing iridescent 'gorget' feathers. Credit: Wade Tregaskis

A new paper from the University of Melbourne reveals how animals use beautiful but unreliable iridescent colors as communication signals. Special adaptations enable animals to control how these shifting colors

appear so that they can convey reliable information. The new work now published in *Trends in Ecology and Evolution* draws together studies from across the animal kingdom to discover how animals control the appearance of iridescent colors in nature.

"Iridescence is tricky to study because the hue that you see depends on the position of the viewer and the direction of light," said senior author, Dr. Amanda Franklin from the School of BioSciences. "That means that iridescent colors change constantly, so it's hard to see how they can convey reliable information. The number one rule for communication is that the information must be reliable—it's the same for both animals and humans!"

But paradoxically, iridescent colors, like dazzling butterfly wings or dramatic peacock feathers, are widespread in the natural world.

Co-author and Ph.D. student Leslie Ng explains: "By studying how animals detect and process iridescence, we can get a better idea of when iridescence is actually a useful communication signal. Reliable iridescent signals usually come with behavioral or physical adaptations that help animals control the visual effect. For example, male Anna's hummingbirds precisely control their courtship flights so that their iridescent throats appear a constant bright pink color to watchful females."

Dr. Franklin said organisms can do beautiful things with light. "Through evolution, they have adapted microstructures to produce specific effects. Some use microstructures to control the precise angle at which the hue of iridescent colors appears to shift. In this way, they control the information they communicate with color."

Ms Ng said many studies suggest iridescent colors are important for courtship or camouflage but rarely consider how these flashy signals are

actually seen by animals. "Because of this, we know very little about how iridescence is processed in the animal's brain."

The detection of iridescent signals also depends on how organisms display color patches, and the physical position of both the signaller and viewer. For example, an iridescent color can be processed differently if it is flashed quickly, or if the colors are fast-moving.

Lead author, Professor Devi Stuart-Fox, said the insights shed new light on the colorful world of animal communication and highlight the challenges of studying accurately how iridescent colors work in nature.

"Nature provides a testing ground for the detection and processing of dynamic and colorful signals," she said. "Understanding how animals reliably use and produce these shifting signals can help the development of bio-inspired iridescent materials designed for human observers."

More information: Devi Stuart-Fox et al. The Paradox of Iridescent Signals, *Trends in Ecology & Evolution* (2020). DOI: 10.1016/j.tree.2020.10.009

Provided by University of Melbourne