

Study shows male chameleons fighting prowess tied to color changing abilities

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ASU researchers have discovered that color changes in chameleons convey different types of information during important social interactions. The lizards' body stripes and head colorings are particularly important during contests over territory and females. Credit: Russell Ligon

(Phys.org) —Two researchers from Arizona State University have found that male chameleons use their color changing abilities for far more than hiding from predators. In their paper published in the journal *Royal Society Biology Letters*, Russell Ligon and Kevin McGraw describe a

study they conducted with captive chameleons that showed that male veiled chameleons use their colors to intimidate other males and that head coloring can predict who might win in a scuffle.

Humans have known about [chameleon](#) color changing abilities (to help them hide) for perhaps thousands of years, even evoking their name to describe other people who change something about themselves for added gain. Now, it appears that the researchers in this latest effort have found that at least one type of chameleon changes its coloring as a means of indicating its willingness to fight other males.

In the study, the researchers collected 10 male veiled chameleons and set them up in paired physical contests to determine which attributes made for winners or losers. To get a better look, each contest was filmed with a [high speed camera](#). Contests generally constituted mostly pushing and shoving with some biting. In reviewing the film, the researchers found that when two males spied one another, they turned their bodies sideways to one another—the better to display body coloring abilities. At this point, many of the males chose to walk away rather than fight. The researchers noted this was most likely to occur by a male that had less vivid coloring. Thus, being outclassed on coloring abilities appeared to be a way for chameleons to ward off unnecessary battles.

The researchers also found that the degree and brightness of head coloring appeared to be a factor for predicting which chameleon would win a battle (which meant the loser giving up and walking away). The brighter the head, the more likely a male was to win. It also appeared that the speed at which a male could change color was also a predictor—faster changeovers meant a male was more likely to win.



When male chameleons challenge each other for territory or a female, their coloring becomes brighter and more intense. During a contest, the lizards show bright yellows, oranges, greens and turquoises. Credit: Russell Ligon

The researchers can't explain why better or faster head coloring makes for better fighters, but suggest it might indicate higher hormone levels, or perhaps be a simple indicator of a stronger or healthier chameleon.



Veiled chameleons (*Chameleon calyptratus*) are native to the Arabian Peninsula -- specifically Yemen and Saudi Arabia. Credit: Russell Ligon

More information: Chameleons communicate with complex colour changes during contests: different body regions convey different information, Published 11 December 2013 [DOI: 10.1098/rsbl.2013.0892](https://doi.org/10.1098/rsbl.2013.0892)

Abstract

Many animals display static coloration (e.g. of feathers or fur) that can serve as a reliable sexual or social signal, but the communication function of rapidly changing colours (as in chameleons and cephalopods)

is poorly understood. We used recently developed photographic and mathematical modelling tools to examine how rapid colour changes of veiled chameleons *Chamaeleo calyptratus* predict aggressive behaviour during male–male competitions. Males that achieved brighter stripe coloration were more likely to approach their opponent, and those that attained brighter head coloration were more likely to win fights; speed of head colour change was also an important predictor of contest outcome. This correlative study represents the first quantification of rapid colour change using organism-specific visual models and provides evidence that the rate of colour change, in addition to maximum display coloration, can be an important component of communication. Interestingly, the body and head locations of the relevant colour signals map onto the behavioural displays given during specific contest stages, with lateral displays from a distance followed by directed, head-on approaches prior to combat, suggesting that different colour change signals may evolve to communicate different information (motivation and fighting ability, respectively).

[Press release](#)

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