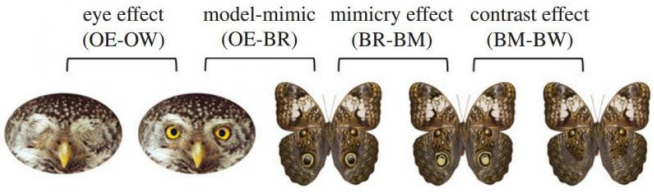
Study suggests fake eyes on butterfly wings mimic eyes of predators

8 April 2015, by Bob Yirka



Credit: *Proceedings of the Royal Society B*, 2015. DOI: 10.1098/rspb.2015.0202

(Phys.org)—A small group of researchers affiliated with the University of Jyvaskyla in Finland has conducted a study looking into the reason why some butterflies have eye-looking images on their wings. In their paper published in the journal *Proceedings of the Royal Society B*, the team describes how they tested one type of butterfly-eating bird with a variety of butterfly and predator images and what they found in doing so.

Most anyone who has seen butterflies has at one time or another come across a variety that has what look like eyes on its wings—the eyes are not functional, of course, they have come about due to some useful purpose, presumably to help avoid being eaten by a predator. Oddly enough, scientists do not really know much about the relationship between the eye markings and prey, though one study by a team in the U.K. recently ended with the conclusion (as described in their paper published in *Current Zoology*) that eyespots do not really mimic eyes at all, at least to predators, instead they simply represent a mesh of colors and patterns that predators do not like. The researchers in Finland disagree, in their study, they tested great tits (a type of songbird) and how they responded to eyed-winged butterflies and found they were clearly put off by eye images that resembled those of owls, which tend to eat such birds.

To come to this conclusion, the researchers placed a computer screen on the floor of a bird cage and placed a mealworm on top of it. When a great tit was placed in the cage, and swooped down to grab the mealworm, the researchers flashed various images on the computer screen to note the reaction by the bird. The images displayed showed one of five types of pictures, an owl with eyes open, an owl with eyes closed, a butterfly with owl-eye-like markings on its wings, the same butterfly with reversed color and the same butterfly with the eyespots removed.

The birds reacted strongly to the image of the open-eyed owl, of course, but they reacted even a little more strongly to the image of the butterfly with the owl-like eye markings. They reacted much less strongly to all the other images. This shows, the team claims, that the birds clearly viewed the butterfly markings as a threat, suggesting they associated the eye markings with great tit eating owls.

More information: Predator mimicry, not conspicuousness, explains the efficacy of butterfly eyespots, *Proceedings of the Royal Society B*, 2015. dx.doi.org/10.1098/rspb.2015.0202

Abstract

Large conspicuous eyespots on butterfly wings have been proved to deter predators. This has been traditionally explained by mimicry of vertebrate eyes, but recently the classic eye-mimicry hypothesis has been challenged. It is proposed that the conspicuousness of the eyespot, not mimicry, is what causes aversion due to sensory biases, neophobia or sensory overloads. We conducted an experiment to directly test whether the eye-mimicry or the conspicuousness hypothesis better explain eyespot efficacy.We used great tits (Parus major) as model predator, and tested their reaction towards animated images on a computer display. Birds were tested against images of butterflies without eyespots, natural-looking

eyespots, and manipulated spot with the same contrast but reduced resemblance to an eye, as well as images of predators (owls) with and without eyes. We found that mimetic eyespots were as effective as true eyes of owls and more efficient in eliciting an aversive response than modified, less mimetic but equally contrasting eyespots. We conclude that the eye-mimicry hypothesis explains our results better than the conspicuousness hypothesis and is thus likely to be an important mechanism behind the evolution of butterfly eyespots.

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