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Mexican fruit flies wave for distraction

Announcing your presence to a prospective predator with a jaunty wave might seem like an unconventional survival strategy, but not for Mexican fruit flies (Anastrepha ludens). When confronted with a ravenous bold jumping spider (Phidippus audax), the courageous little flies waggle their wings and perform some fancy footwork while raising their rear end, apparently advertising their presence. But instead of provoking an attack, the fly’s nifty wing work usually deters its opponent, with 90% of spiders hesitating and walking away. ‘Attention has usually been focused on the pigmented fraction of the wings’, says Dinesh Rao, from the Universidad Veracruzana, Mexico, explaining that the flies’ distinctive wing markings were thought to discourage their would-be assailants. But Rao and his colleagues Skye Long and Elizabeth Jakob, from the University of Massachusetts, USA, weren’t so sure, so, with an international team of collaborators, they arranged fruit fly versus jumping spider confrontations to find out whether the fruit flies’ wing manoeuvres flummox bold jumping spiders.

In a miniature arena divided in two, Samuel Aguilar-Arguello (New Zealand Forest Research Institute) allowed the insect and its opponent to adjust to their new accommodation before revealing the adversary on the other side of the partition. ‘When the spider detects the fly, it turns around so it can see the fly with its large frontal eyes, and the fly starts making looping movements while waving its wings’, says Rao, who filmed the skirmishes, noticing that the spiders seemed more distracted when their opponent was waving its wings. Instead of straightening their bodies to stare directly at the fly ready to attack, the unfocused spiders positioned themselves to one side as if distracted. Then, Rao showed the spiders movies of static, walking and wing-waving flies, while tracking the spiders’ eye movements, and discovered that the spiders struggled to focus their principal eyes (one of their four pairs) on the flailing flies. However, the arachnids successfully followed the walking flies’ heads, so simply sauntering didn’t cause the spiders any problems. And when Kevin Salgado Espinosa (Universidad Veracruzana) fiddled with the lighting conditions, to vary how much the wings stood out in the spiders’ view, the spiders were less likely to attack when they could clearly see the waving wings’ iridescent sheen, whereas shininess didn’t seem to offer much protection. But what were the spiders really seeing as the flies whirled their wings for distraction?

After simulating the spider’s view of a fly as it wafted its wings, Luis Robledo-Ospina (Universidad Veracruzana) realised that motion confuses the spiders’ vision as the body parts moved in different directions, making it difficult for the spider to focus and launch a precise attack. In contrast, the spiders should have no problem fixing their gaze on a walking fly as all of its appendages move in the same direction. And Rao suspects that keeping their heads stationary while whirling their wings could buy the vulnerable flies valuable moments to assess their opponent and plan evasive action.

So wing-waving Mexican fruit flies aren’t being friendly as they apparently draw attention to themselves with their boldly sweeping wings; the insects are actually disguising themselves in a blur of motion that should hopefully distract their opponent long enough to stage an exit. And Rao and colleagues speculate that male bold spiders could also indulge in a spot of blurry camouflage when attempting to attract a female. ‘Courtship can be dangerous for males’, says Rao, explaining that vanishing briefly in a haze of movement could allow males a few instants to move in closer while the female is distracted, rather than end up directly on her dinner table.

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