

SUPPLEMENTARY MATERIAL

SCENARIO 1: You are a biologist who gets a call from a homeowner who notices that a number of dead bats have appeared overnight on his skylight. You have recently heard that bats drink water by “gleaning”, a behavior in which a bat flies over the water and dips its face in to drink. You suspect that the bats are mistaking the skylight for water and smashing into it while trying to “glean”. Based on the knowledge of this behavior:

1) What property of the glass is causing the bats to make this mistake?

2) What senses of the bat are being fooled?

3) How might changes be made to prevent bats from dying?

SCENARIO 2: You are a biologist who gets a call from a store owner who notices that a number of shearwaters, an open-ocean species of bird similar to gulls, appeared overnight in the parking lot in front of his store. They seem to be unable to fly away and are very tired. You have recently learned that these birds navigate using moonlight (much like baby sea turtles), and that they regularly land on the ocean surface. As the birds need to be able to run across the water to take off, you suspect that the birds are stuck. Based on the knowledge of this behavior:

1) What property of the parking lot is causing the birds to make this mistake?

2) What senses of the birds are being fooled?

3) How might changes be made to prevent birds from landing and potentially dying?

SCENARIO 3: You are a biologist who gets a call from a park ranger who notices that a number of songbird nests have failed this year in her park, meaning that they did not produce young. She notices that most of the failed nests are located along a 5-mile trail that has very recently become particularly popular with dog-walkers. Based on this observation:

1) What could be causing the failure?

2) What sense(s) of the birds are being fooled?

3) How might changes be made to prevent birds from reacting to dogs as predators?

KEY

SCENARIO 1: You are a biologist who gets a call from a homeowner who notices that a number of dead bats have appeared overnight on his skylight. You have recently heard that bats drink water by “gleaning”, a behavior in which a bat flies over the water and dips its face in to drink. You suspect that the bats are mistaking the skylight for water and smashing into it while trying to “glean”. Based on the knowledge of this behavior:

1) What property of the glass is causing the bats to make this mistake?

The smoothness (texture) of the glass and the horizontal position of the glass could be fooling the bats. Water has a smooth texture, unlike most other surfaces in nature.

2) What senses of the bat are being fooled?

The bat’s hearing is being fooled. Bats navigate their environment by relying upon echolocation, a behavior in which high frequency vocalizations (sound waves) are emitted, and the echoes are interpreted by the bat to form a “picture” of its surroundings. The sound waves bounce off of the smooth glass in a way that is similar to how they bounce off of smooth water.

3) How might changes be made to prevent bats from dying?

The texture of the glass could be changed so that sound bounces off of it differently, or the plane (horizontal position) of the glass could be changed. Both would allow the bat to interpret the surface as “not-water”.

Supporting article:

<http://blogs.discovermagazine.com/notrocketscience/2010/11/02/how-bats-find-water-and-why-metal-confuses-them/#.U8GWQy8h-Fc>

SCENARIO 2: You are a biologist who gets a call from a store owner who notices that a number of shearwaters, an open-ocean species of bird similar to gulls, appeared overnight in the parking lot in front of his store. They seem to be unable to fly away and are very tired. You have recently learned that these birds navigate using moonlight (much like baby sea turtles), and that they regularly land on the ocean surface. As the birds need to be able to run across the water to take off, you suspect that the birds are stuck. Based on the knowledge of this behavior:

1) What property of the parking lot is causing the birds to make this mistake?

The dark color of the asphalt as well as any street lights or other light sources in the parking lot could be fooling the birds.

2) What senses of the birds are being fooled?

The vision of the bird is being fooled. Their ability to navigate using nocturnal cues (signals) of moonlight is being disrupted by the street lights. They could be tired from flying around the street light (like a moth around a lightbulb) and landing, exhausted, on the pavement.

3) How might changes be made to prevent birds from landing and potentially dying?

The streetlight could be turned off during times of year when this would be a problem, such as when young birds are passing by. The wavelength of light could also be changed

so that the light source does not mimic the moon, but still provides visible light at night. Perhaps the color of the asphalt could be changed so that it does not resemble the ocean at night.

Supporting article: <http://www.birdlife.org/datazone/sowb/casestudy/488>

SCENARIO 3: You are a biologist who gets a call from a park ranger who notices that a number of songbird nests have failed this year in her park, meaning that they did not produce young. She notices that most of the failed nests are located along a 5 mile trail that has very recently become particularly popular with dog-walkers. Based on this observation:

1) What could be causing the failure?

The dogs look like predators. They walk on four legs and have movements similar to coyotes, wolves, and foxes, all of which could be nest predators. The adult birds could be scared off of the nest by the dogs or behaving in such a way that is making both the adults and the nests vulnerable to other predators. They could also be abandoning the nests out of fear of the dogs.

2) What sense(s) of the birds are being fooled?

The **vision** of the bird is being affected. The birds are seeing the dogs and associating them with predators. Students may suggest hearing, but for many bird species, vision is a primary sensory modality, and it has been shown in scientific studies that utilizing fencing that reduces human and dog visibility leads to fewer disruptions in bird behavior (Ikuta and Blumstein, 2003).

3) How might changes be made to prevent birds from reacting to dogs as predators?

Dogs could be prohibited from areas that are particularly sensitive, or prohibited at certain times of year (breeding season). Fences could be put up to hide the dogs from the birds. This would appease recreational users of the park (dog-walkers) as well as biologists and other people concerned with the safety and welfare of the wild animals.

Supporting article:

<http://scienceblogs.com/grrlscientist/2008/03/20/dog-walking-harms-wild-birds/>

References: Ikuta, L. A., & Blumstein, D. T. (2003). Do fences protect birds from human disturbance?. *Biological Conservation*, 112(3), 447-452.