

Blind Spot

Hawk eyes

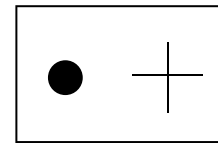
What you need!

- One 3 X 5 inch (8 x 13 cm) card or other stiff paper
- Black marker

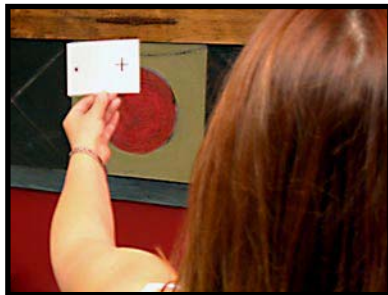
Why do eagles have eagle eyes? It's because they have two foveae. Foveae are areas on the eye's retina that receive and react to incoming light. All eyes also have a blind spot, but the fovea compensates for this by allowing more light into the retina. Most animals, including humans, have one fovea in each eye but, because hawks and eagles have two foveae, they are much better adapted for sight than we are.

What you do:

1. Draw a dot and a cross on the card. (See Illustration)



2. Hold the card at eye level, arm's length away. Make sure the cross is on the right.



3. With your free hand cover your right eye and look directly at the cross with your left eye. Notice that you can also see the dot.

4. Focus your left eye on the cross but be aware of the dot as you slowly bring the card toward your face.

5. Notice what happens to the dot as the card is brought towards your face.

6. Try the experiment again using your right eye. Make sure the cross is on the left side this time.

7. Now try it with both eyes open.

Ask yourself

- What happens to the spot as you move the card closer to your face?
- What happens when you move it back?
- What is causing the blind spot in each of your eyes?
- Why don't you notice this when you use both your eyes?
- How could you overcome the problem of having a blind spot?
- Why do you think hawks and eagles might need to have an extra fovea?
- What other animals or birds might benefit from an extra fovea?

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What did you find out?

As you move the card closer to your eyes, the dot disappears. When you move it back, the dot reappears.

The blind spot in each of your eyes is located where a bundle of nerves joins the retina (light-sensitive inner lining) of the eyes. This nerve bundle (optic nerve) relays messages from the retina to your brain, and allows you to see. Normally we don't notice our blind spot because the light that enters our eyes hits the fovea, a particularly sensitive part of the retina. When we use our peripheral vision, such as in this experiment, we do not use our foveae.

When you are looking at the world with both your eyes, your brain automatically fills in the blind spot with the information that the other non-blinded eye is receiving. Our foveae have about 200,000 light sensitive cells on each square millimetre. This allows us to have pretty good vision when we are looking directly at an object.

Birds, like the Red-tailed Hawk, manage to outdo us on two counts. These birds have two foveae in each eye. This allows them to have better perception and peripheral vision because a larger surface of their retina is sensitive to light. These birds also have much more acute eyes, with over 1,000,000 photo receptive cells per square millimetre of both their foveae. Hawks and eagles need this acute eyesight to help them spot and catch prey.

Specific Learner Expectations (SLE)

Grade 1 Topic D: Senses.

SLE 4: Recognize the limitation of our senses and identify situations where our senses can deceive us; e.g., optical illusions.

SLE 5: Recognize that other living things have senses and identify ways that animals use their senses: danger; finding food; recognizing mates and babies.