

What can we learn about an owl by looking at its face?

A Science activity for Years 2/3

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One area of interest for biologists is the relationship between form and function. Living things have certain features because they have evolved in ways that adapt them to their environments. Adaptation and evolution are fundamental biological concepts and, although they are sophisticated and complex, even the youngest children can begin to grapple with them through exploring specific examples.

The activity makes use of a simple database of animals with just six different fields. Children must interrogate the database for access to the data that will allow them to answer simple questions about why owls look the way they do. The activity and database may be found on the CD-Rom.

Few children will be able to tackle the investigations without support. It will certainly be necessary to work through the first challenge as a demonstration with much discussion.

Investigations

1. *Owls have big eyes. What does this tell you about them?*

To solve this children will need to search the database to find all the other animals with big eyes [search Eye size = large]. The records for these 5 animals will be displayed. Children must then scan the 5 records to find what feature all these animals have in common (all are nocturnal). The following record can then be completed (worksheet provided).

The other animals with big eyes are
All of these animals
I think that owls have big eyes so that

The final statement is phrased ‘I think...’ because it should be seen as a starting hypothesis. Discuss with the children how they might check this hypothesis by searching for all the animals that do not have big eyes [search Eye size = small or (more sophisticatedly) Eye size ≠ large]. The records for these five animals will be displayed and can be scanned as before (all are active in the daytime). The worksheet can then be completed with the new finding and a definitive statement.

The animals that *do not* have big eyes are
All of these animals
Owls have big eyes so that

It is one thing to decide that owls have big eyes so that they can see in the dark and quite another to understand why large eyes (or more specifically large pupils) help. At this level it is sufficient for children to understand that large eyes are better at catching whatever light is available. You might also like to discuss the owl’s powerful sense of hearing and how this also helps them in their nocturnal habit (e.g. an owl can hear a mouse’s heartbeat at a distance of approximately 10 metres).

The basic format is similar for each of the other two investigations:

2. *Owls have sharp beaks. What does this tell you about them?*

Search the database to find all the other animals with sharp beak or teeth [search Beak/Teeth = sharp]. The records for these 5 animals will show that all eat animals (in the case of the bush baby these animals are insects but this is not differentiated in the database).

The other animals with sharp beaks and teeth are
All of these animals
I think that owls have sharp beaks so that

Again, to check this hypothesis search for all the animals that do not have sharp mouth parts [search Beak/Teeth = rounded or (more sophisticatedly) Beak/Teeth ≠ sharp]. All eat plants in some form – grass, seeds or leaves. Some categorisation will be needed here, which makes this a more sophisticated task than Investigation 1. It will be clear that these animals do not eat animals but what is common about all the items they do eat?

The animals that *do not* have sharp beaks or teeth are.....
All of these animals
Owls have sharp beaks so that

3. *Owls have eyes at the front of their heads. What does this tell you about them?*

Search the database to find all the other animals with forward facing eyes [search Eye position = front]. As with sharp teeth, all are carnivorous.

The other animals with eyes at the front of their heads are

All of these animals

I think that owls have eyes at the front so that

To check this hypothesis search for all the animals that do not have forward facing eyes [search Eye position = side or (more sophisticatedly) Eye position ≠ front]. The records for these five animals will be displayed and can be scanned as before. Again these are all plant eaters. They also all have predators (enemies). Having spotted this, children may wish to refer back to the previous set of animals (with forward facing eyes) and will note that only one of these, the bush baby, has any enemies. Discussion can focus on why it could be useful to animals with enemies to have eyes on the sides of their heads (to keep a lookout for what might be creeping up on them).

The animals that *do not* have eyes at the front are

All of these animals

They have eyes at the side so that.....

Owls have eyes at the front so that.....

Extending the science

More about seeing in the dark.

Ask children to look at their own eyes in a mirror or the eye of a partner. Ask them to draw the eyes and think about the different parts (white, coloured iris, black pupil).

Focus attention on the pupil and look at the eyes in bright light (face a window) or in dim light (in a cupboard, cloakroom, under a table). Most children will be able to see that the pupil expands in dim light and contracts in strong light. Explain that the expanded pupil lets in more light to help them see in the dark.

More about feeding parts

Mammals have teeth and birds have beaks – but the principal of sharp tools being necessary to cut

or tear meat and to kill prey applies to both mammals and birds. Children may well have experience of trying to cut with blunt knives or blunt scissors! Under supervision allow them to try cutting tough materials with blunt and sharp instruments. Ask what tool would they choose to cut skin (leather) meat (a piece of steak) or bone.

More about eye position

Animals that need to be able to judge distances accurately in order to catch their prey usually have forward facing eyes. Ask children to work in pairs facing one another. Child 1 holds up a finger just within reach of child 2. With both eyes open child 2 should touch the tip of the finger with his/her own. Now repeat the task with a hand over one eye. Most people are able to judge distances better with both eyes open. This is because each eye sees a slightly different view and the brain puts the two views together to make a 3D picture.

Animals which do not need such precise distance vision, because they eat food which does not move, usually have eyes on the sides of their head. This gives them a wide field of view enabling them to watch for predators more effectively. Ask children to hold their head steady and keep eyes facing straight ahead. They should then hold up their hands in front of them and move them slowly out and round until they meet at the back of their head. Ask them to stop and hold the position when the hands disappear from view. The range of view is not much greater than a hemisphere (for humans with front facing eyes).

Looking at exceptions

The small database used for this activity has been constructed to make the connections easy to discover. However the real world is not quite so tidy. The anomaly in this data set is the bush baby which has forward facing eyes although it does have predators. Many carnivores come at the top of the food chain with no substantial predators. Where a carnivore does have predators the advantages of front facing eyes usually outweigh the advantages of all round vision.

The data

	Owl	Bush baby	Ocelot	Hare	Tiger	Sparrow	Mouse	Giraffe	Deer	Lion
Eye size	Large	Large	Large	Large	Large	Small	Small	Small	Small	Small
Active Time	Night	Night	Night	Night	Night	Day	Day	Day	Day	Day
Eye Position	Front	Front	Front	Side	Front	Side	Side	Side	Side	Front
Food	Animals	Animals	Animals	Grass	Animals	Seeds	Seeds	Leaves	Grass	Animals
Beak/ Teeth	Sharp	Sharp	Sharp	Rounded	Sharp	Rounded	Rounded	Rounded	Rounded	Sharp
Enemies	None	Tiger	None	Fox	None	Cat	Cat	Lion	Lion	None

Owls have big eyes

The other animals with big eyes are

All of these animals

I think that owls have big eyes so that

The animals that do not have big eyes are

All of these animals

Owls have big eyes so that

Owls have sharp beaks

The other animals with sharp beaks and teeth are

All of these animals

I think that owls have sharp beaks so that

The animals that do not have sharp beaks or teeth are

All of these animals

Owls have sharp beaks so that

Owls have eyes at the front of their heads

The other animals with eyes at the front are

All of these animals

I think that owls have eyes at the front so that

The animals that do not have eyes at the front are

All of these animals

They have eyes at the side so that

Owls have eyes at the front so that _____
