

I BET YOU DID'T KNOW...

Stripes and concealment

Prof. Dudley Shallcross, PSTT CEO, links **cutting edge research** with the **principles of primary science**



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"BETWEEN THE LINES - WHEN STRIPES HELP US AND WHEN THEY WARN US"

Many animals use stripes to warn that they may be dangerous or to help conceal them from predators and prey. We learn from an early age to be wary of wasps and we may have seen more exotic animals such as tigers on the television or other digital platforms, or may have seen a real one.

With our primary school children, we can discuss how animals hide themselves, which animals use stripes and ask whether they use other patterns. Why do animals need to be camouflaged? It might be useful for children to have an opportunity to look at and discuss the purpose of different examples of camouflage: concealing with colouration similar to the surroundings (Can they also think of examples where animals' coats change seasonally?); disguise through having similar shape and texture to surroundings (e.g. stick insects); mimicry of other animals (Why might an animal want to resemble another?); and disruptive colouration such as stripes or

spots to help them blend with the surroundings (e.g. tigers etc). Depending on the age/abilities of the children, they could undertake image grouping/sorting activities, or research into animal camouflage.

What do the children think is the best type of stripe for a particular environment? There has been a lot of research on camouflage (we may want to ask the children why humans might be interested in this) but a recent study specifically looked at different striped patterns to see which of these were easier for birds to see and for humans to see. The researchers made some artificial moths that were patterned, attached them to trees and observed whether a particular patterned moth was taken by a bird more often compared with other types of pattern. They also asked human volunteers to report at what distance they could see these artificial moths.





We can ask the children to imagine doing this experiment. What would they need to think about to make sure it was a fair test? What striped patterns would they think were more effective at concealing the moth and what striped patterns were less effective (What is their hypothesis?). Ask the children to consider how the thickness of the stripes, the angle of the stripes and whether the stripes are straight or wavy lines might have an effect. What colours are the best to use to conceal a moth? Children could be encouraged to plan and carry out simple investigations of their own based on humans' ability to see sample moths. They could try to replicate the researchers' tests or create similar ones based on their own questions about types of camouflage patterns.

The researchers cut triangular pieces of water-proof paper (25 x 50 mm) and used both vertical or horizontal patterns that were either olive-and-black or yellow-and-black. A total of 18 combinations were used and some examples are given in figure 1.

The artificial moths were attached to the tree (experiments were carried out in winter) and each moth was baited with a dead mealworm larva. A variety of birds such as blue tits, European robins and chaffinches that were present in the wood were then able to remove the mealworm. The number of larvae removed in a given time was recorded. In addition, 9 women and 9 men were asked to walk a set path and note when they could see the moth targets and to record the distance from the target when they first saw the artificial moth.

The researchers found that when the olive-and-black stripes matched the background best, in terms of stripe width and orientation, the moths were well hidden from both the birds and humans. However, for the yellow-

and-black stripes, the best survival rates (with respect to the birds) didn't match what would be assumed to be the best matched pattern. In fact, the best camouflaged striped patterns were at a higher frequency (closer together). The orientation of the stripe made no difference to the results and the distance they were detected by humans was not affected. Why did the birds not take the yellow-and-black moths, even though they were 'more visible'? (Maybe the children can suggest



some answers?) Perhaps the bird's sight is such that the frequency of stripes with that colour combination cannot be detected easily, or maybe the combination reminds the bird of an animal that it does not like (e.g. a wasp). It would be good to discuss: Would the results be different in another season? The scientists only carried out their investigation in winter and suggest that other important factors should be investigated in the future (e.g. amount of foliage, weather conditions, light). It is important to remind children that scientists continue to increase their understanding by refining their ideas and considering more possible variables over time. What might the children consider next in their own investigations?

Figure 1. Schematic examples of triangular targets used; thicker, thinner and wavy lines were all used.



Discuss this question with the children:

What do you think experimental psychology is?

The research paper that generated this work was:

Stripes for warning and stripes for hiding: spatial frequency and detection distance

By James B. Barnett, 1 Annabelle S. Redfern, 2 Robin Bhattacharyya-Dickson, 1 Olivia Clifton, 1 Thomas Courty, 1 Thien Ho, 1 Annabel Hopes, 1 Thomas McPhee, 1 Kaitlin Merrison, 1 Robert Owen, 1 Nicholas E. Scott-Samuel, 2 and Innes C. Cuthill. 1

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