



Ring the Changes 2

Activity One
Combinations and Permutations.

Activity Two
Mirror Images

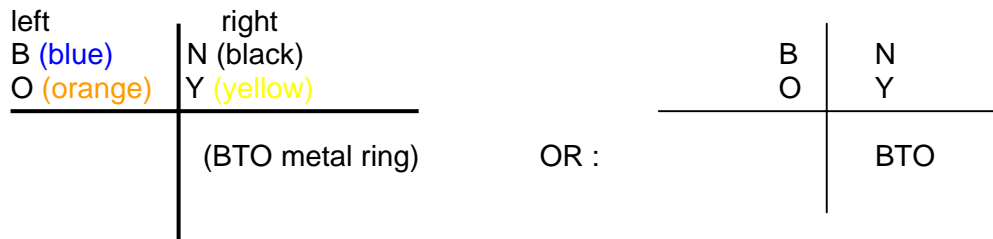
This Greenshank project is possible because birds can be fitted with 4 coloured rings on their legs. 8 different colours are used;
 red, dark green, black, lime green,
 orange, blue, white, yellow.

The colour combinations are arranged so that any individual bird can be distinguished. Colour-rings can be on the upper leg (tibia) as well as on the lower leg (tarsus).

As well as colour rings, every bird should have a lightweight, uniquely numbered, metal ring from the British Trust for Ornithology (BTO). Each metal ring also bears an address so that anyone finding a ringed bird can help by reporting its whereabouts and fate. These rings can only be read if the bird is caught whereas the colour rings can be seen with binoculars.

Activity One - Combinations and permutations

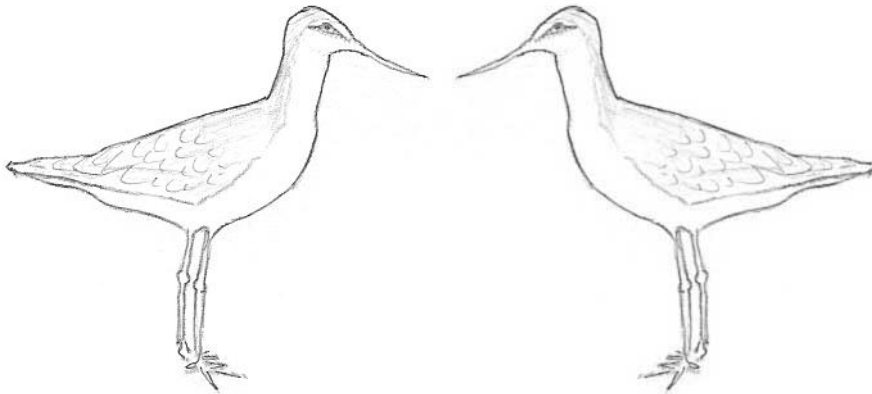
When a bird is caught or sighted the rings can be recorded like this, with the cross showing where the knee joint is.



Now try some different combinations putting 2 rings above the knee on each leg.

- How many combinations are possible with 2 colours?
- How many combinations with 3 colours?
- Can you work out a formula for the number of combinations possible with 4 colours?
- Try putting one ring below the leg joint, or using only 3 rings –how much does this change the number of combinations?
- Farlington ringers like to keep the lower ring on the right leg yellow – how many combinations can they make?

Activity Two – mirror images – lateral symmetry



Ringers do not like using combinations that are mirror images in case the left and right legs get confused by the observer.

- Which of the combinations below are mirror images?
- How many of your combinations from Activity One are mirror images?

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