

Task Card: Battle of the Beaks: Which beak is “best”?

Adapted from The Linnean Society “Battle of the Beaks” <https://www.stem.org.uk/rxzx5>

In this activity, pupils simulate bird feeding by using a beak to collect food and place it into a stomach. There are four different beak shapes and a range of different food types to choose from.

Resources required: Paper cups (“the stomach”), paper plates (“feeding area”).

For beaks: scissors, teaspoons, tweezers, clothes pegs

For food: paperclips, rubber bands, toothpicks, uncooked dried pasta (e.g. macaroni), marbles, mini marshmallows, peas

Background

In any habitat, food is limited and the types of foods available can vary. Animals with variations allowing them to take advantage of available foods will be more likely to survive. This activity allows pupils to explore the wide variety of beak types that can be seen within the bird population, as well as developing an understanding of the way in which beak shape is related to the available food sources within an environment.

Possible approach to activity

Each pupil selects one of either a spoon, tweezers, clothes peg or scissors plus a plastic cup—they are now birds. The chosen implement is the beak, and the paper cup is bird’s stomach. The beak must be held in one hand and the stomach should be placed on the floor. The stomach must remain upright at all times, and pupils can only put food into it using their beak.

- Some food items (paperclips, rubber bands, marbles, etc.) will be placed in the feeding area (on a paper plate), and spread out evenly among the birds. When the teacher says ‘go’ pupils use their beak to collect as much food as they can, and place it in their stomach. Allow 1–2 minutes to feed. At this point, pupils should stop feeding and count the items in their stomach, then return the items to the teacher and record the total on a data table (see possible example).

Food type	Paper clips	Rubber bands	Pasta	Toothpicks	Marbles	Peas	Marshmallows
Beak type							
Scissors							

- Follow this activity by distributing a different food type, pupils repeat the experiment. Pupils can collate their individual results into a class data set.

Possible prompts for supporting pupil discussion

- In this experiment what is the dependent variable? What is the independent variable?
- Why is it better to use data from the entire class averaged together when assessing results and creating a graph, rather than using only your own data? For this experiment is it better to use a bar graph or a line graph to display the data? Create the appropriate graph from your class data set.
- What did you notice about your behaviour and the behaviour of the other ‘birds’? Is this similar to the behaviour of birds in the wild?
- Obviously most habitats have more than one food type available. What was your strategy when all food items were available? How did this differ from your strategies in the previous scenarios?
- What if the paper clips were high-protein beetles that were four times more nutritious than any of the other food items? Would your feeding strategy change?
- What would happen if all of the birds simulated here flew to an island where no birds had been before, and the only available food was raisins. Which birds would be most successful? Which would be least successful? If we came back to the same island in 50 years, what would you expect to see?



Wikimedia/L. Shama

Not to scale

The diagram above shows how different beak types are adapted to different feeding strategies. The generalist beak type is used by bird that are less specialised feeders.

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Possible extension ideas

Woodland walk

Visit a local park or woodland area and observe the birds found there. Make notes on their appearance, paying special attention to features that differ widely between species (such as beak shape). Take photographs or produce sketches of the birds observed. Once back in the classroom, use ornithology books or the internet to identify the species of birds seen. Try to find out about the feeding habits of these birds—can you formulate a theory as to why the birds have the specific features you have noticed?

Survival of the fittest through natural selection

- Pupils work in pairs. Each pupil is allocated a beak type (a peg, pair of tweezers or a plastic spoon). Pupils then collect a beaker containing 30 peas, their beak implements and a stopwatch.
- Pupils have 15 seconds to compete with their partner for the food in their beaker. They can only use their beak to pick up food, and they cannot pick up another food item until the previous one is safely in your hand. If they drop any, they will need to use their beak to pick them up before they can continue. After 15 seconds, each pupil counts how many food items they have. The winner is the one with the most, and at this point the losing bird ‘dies’—it has been outcompeted. The winning bird ‘reproduces’ - in this simulation the losing bird will swap their beak type to that of the winner. (Make there are plenty of each type available!)
- Pupils swap partners and repeat the competition until pupils have competed it three times. After three competitions, record the frequency of beak types in your population. Now complete another three competitions before stopping and recording the frequency of beak types again.
- Ask pupils to explain what happened to the bird populations as the experiment progressed and why. Do you think this is an accurate representation of population dynamics in a real-life ecosystem?
- In the experiment above, the losing birds died at the end of each round of the experiment. Eventually, the weakest species will die out altogether. This is a natural and essential part of the evolutionary process, but in some cases the extinction of species has been hastened by human intervention.

Exploring endangered species

Visit the IUCN Red List website (www.iucnredlist.org) and research some species which are critically endangered. Have these species been naturally outcompeted, or have humans played a role? Pupils might write a report on their findings.