Food fighters

Why do siblings fight with each other? A look at the science behind this universally common behaviour

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AMONG all the myriad animal, bird and insect species that we share this planet with, one behavioural phenomenon that has always interested scientists is that of parent-offspring and inter-sibling conflicts. Common to almost all these species — including humans — it has never failed to generate curiosity among experts who have continued studying these conflicts in their attempts to better understand the behaviour of these creatures. Though the reasons for such conflicts in humans are many, in most other species it centres around food, the basic means of survival.

In 1979, Robert Trivers, an American biologist, tried to explain these curiously-common conflicts through a series experiments. He was trying to explain conflicts usually witnessed in animals. Trivers' experiments were simple enough. He created artificial shortages in the food supply of the test animals and then studied the resultant behavioural changes.

From these experiments he theorised that when a parent has a small amount of food — barely sufficient for the survival of one of its offspring — both parent and the offspring agree that the latter should get the food thus avoiding a conflict. However, a conflict scenario arises when the parent has some more food to offer. Now, the parent and offspring do not agree on how to use it. Ideally, the parent should prefer to save the extra food for the benefit of its other offspring as all offsprings are valued equally by the parent. The other offspring, however, would want the extra food for itself since it values itself more than its siblings. If the parent has some more food to offer, speculated Trivers,

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Food feuds

then there would be some agreement — ideally both parent and offspring should agree that this extra food should be divided equally among all the siblings. Trivers said that beyond a certain point, extra food may not make much difference to the survival of this particular offspring, but may greatly enhance the chances of survival of its other starving siblings. He predicted that if the siblings benefit more than twice than the particular offspring, then it should let them have the food.

So far, there has been enough experimental evidence from field and laboratory studies of many kinds of animals — even plants — to support what Trivers had predicted, that parents and offspring agree without conflict at low levels of parental investment, with conflict arising only at higher levels. The so-called weaning conflict, where parents prefer to stop suckling their offspring while the latter wishes otherwise, is a striking example of such a parent-offspring conflict. However, there does not appear to be good evidence from rigorous studies that, at a higher level of investment, offspring should agree with parents that all extra food should go to their siblings and not to themselves.

A recent study of sibling tolerance in the blue-footed booby (*Sula nebouxii*) in the Galapagos islands by D J Anderson and R E Ricklefs also provides support for this prediction. In the blue-footed booby, older chicks can be very dominant, preventing their younger siblings from getting their quota of food and even killing them if the need arises. In fact, the dominant chicks are so aggressive that the parents have very little say in the pattern of food distribution — the subordinate chicks get food only with the dominant ones' approval. When the researchers artificially created severe shortages of food, the dominant chicks forced their subordinate siblings to die of starvation, while they ate up all the available food. However, when the experimenters created only mild shortages, these dominant chicks, despite enjoying the upper hand, allowed the subordinate chicks to share some of the food.

This tolerance in behaviour can be explained by two alternative hypotheses. One, the so-called "leftover" hypothesis suggests that the dominant chicks consume as much food as they can and then let the subordinate chicks take only the leftovers. The Trivers hypothesis suggests that the dominant chicks would share some of the food with their subordinate siblings even before they get all they can possibly eat as the last morsel might be twice as beneficial to their siblings than it would have been to themselves.

For each of the above hypothesis, mathematical models can predict precisely the level of satiation at which the dominant chicks should begin to share food with their subordinate siblings. The work of Anderson and Ricklefs shows clearly that the Trivers hypothesis is correct. The dominant chicks do not wait until they are completely satiated (as predicted by the "leftover" hypothesis) but begin to share a part of the food with their helpless, subordinate siblings exactly when the mathematical models predicts. ■