Birds of almost the same feather, flock together

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Birds eat a lot to fuel their high-flying, high-energy lifestyle. Usually small, warm-blooded and with a small gut, they end up spending most of their days searching for food. To make life easier, birds often team up to form flocks. Many birds form flocks with their own kind, but some join other species to form mixed species flocks[1]. Figure 1 is a painting representing a typical mixed species flock.

Flocking together has the obvious benefit of many eyes being better than two while searching for food. A flock is also an effective early warning system; some birds can act as sentinels and warn if a predator is on its way, while others are busy feeding. Such benefits are most rewarding when species similar to each other flock together[2]. But, similar species together in the same flock also gives rise to a lot of competition[3]. What species ultimately join together in a flock is a result of a cost–benefit trade-off, with the costs of competition balanced against the benefits of association within a flock.

Hari Sridhar (Centre for Ecological Sciences at Bangalore) 'flocked' with 24 other ecologists from around the world to examine insect hunting teams in land birds[4]. They compiled data from 24 studies that spanned 4 continents and two island groups, involving a total of 803 bird species – about 8% of the known bird species in the world.

With information from about 55 datasets in hand, the ecologists looked for overall patterns: are flocks formed of similar species, or different species? In other words, are there 'assembly rules' that govern which species make up a flock?

Nature of the relationship

The first thing to study was the nature of interactions between different species. For this, Sridhar and co-workers broke up the datasets into pairs of species. The aim was to figure out the relationship between the species within each pair. They first looked at whether the two species interacted at all. If they did interact, two things could happen: they could benefit from each other and go into the same flock, or they could repel each other, through competition for example, and not flock together.

A little detour: when studying how species group, one must be cautious. Two species can occur together in the same flock simply due to chance. There is a way around it – a statistical trick called a 'null' model. The null model does exactly what it says on the tin: it sets the stage, showing how the data would look if there was no ecological process operating. To generate a null model, some parts of the dataset are held constant and the others are allowed to vary randomly, in a process called randomization[5].

Coming back to this study, the authors looked at each species pair and compared the 'real' data from the 55 datasets, with the corresponding data from the null model. They then branded each species pair with a number, a reflection of how the two species interacted with one another[6]. The number can be zero, meaning no interaction; a positive number, implying they seek out each other and get on-board the same team; or negative, suggesting the species actively avoid each other.

Who is my mate?

Armed now with a good idea about how species were interacting, the team moved on to look at what kinds of birds got together. For each bird species, they collected three pieces of information. Body size – because birds of similar body size use the same kind of resources. How the bird species went about hunting for

Figure 1. A mixed species bird flock from a tropical evergreen forest in the Western Ghats, India. Artist: Rangu Narayan.

insects – how they searched, attacked and handled their food for example. And, whether the species were related to one another, because closely related species – like the ones belonging to the same genus – use the same kind of resources.

The group could now look at how the kind of bird species affected the association strength between species pairs. These analyses were repeated for all datasets; later, the results from all the datasets were compiled into a 'meta analysis'. A meta analysis is a set of methods used to combine results from different datasets, so that patterns across datasets can be described.

The relationship between the association strength and bird characteristics answered the main question asked by the study: whether flocks consist of similar or dissimilar species. As Sridhar puts it, 'What we wanted to really get at is whether flocks are largely groupings of similar or dissimilar species. A central idea in ecology is that similar species are more likely to compete and therefore avoid each other. But, it is also possible that species can benefit by grouping with similar species as they are likely to share the same food and predators.'

The answer was clear: the relationship was positive, implying that flocks of birds were made up of similar species. This relationship held even between closely related species. Species belonging to the same genus, between whom you would expect maximum competition, were also flocking together. In fact, species from the same genus were coming together in flocks thrice as much as species from different genera.

However, the authors also add a word of caution. Even though the meta analysis threw up some overall patterns, there were some datasets where the relationship between association strength and bird characteristics was opposite that of the overall trend. The authors feel this is probably because the effect of geographical differences was not examined in this study. It mostly had datasets from tropical areas; so these results are more applicable to tropical areas. Also, the results do not mean that there is no competition between members of the same flock. Some species may have been thrown out from a flock due to competition before the ecologists got to the flock, for instance!

The more the merrier

Still, the advantages of similar species coming together and hunting for the same kind of food (insects in this case) are many. Similar species eat similar kind of food, so they can share information about where the next meal can come from. The same or similar predators also hunt them, so they can alert each other when a predator draws close.

Being in the same group with *similar* species, but not members of your own species, has its advantages. Without competing with members of the same species for identical resources, the birds can flock with other species with similar palates and still get the benefits of living in groups: they can hunt for more food in lesser time, and have more eyes to watch out for predators.

According to the authors, the results question the stereotyping ecologists are tempted to make: just because species are ecologically similar, they may not necessarily compete with each other. If a species could benefit from grouping, it may be more profitable for the species to form a group with a similar species than a distant one.

The pattern of similar species grouping together for mutual benefit is also seen in other species. Plants of different species sometimes share the same pollinators, and butterflies of different species mimic the anti-predator warning patterns of their wings. 'Mixed flocks are only the third example of a system in which positive interactions between similar species have been documented. It is possible that this pattern is much commoner than we think; more and more examples of positive interactions are being documented these days. This is not so surprising – organisms are likely to encounter many more individuals of other species compared to their own species', says Sridhar. More studies are necessary before making generic statements about the importance of positive interactions between species in shaping communities.

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