Raven teenager gangs play by game theory

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Game theory models predicted that young ravens gain the greatest advantage from hunting in a pack. Now the young birds have figured this out for themselves, and form gangs to oust older raven pairs from tasty carcasses.

Young ravens have transformed their hunt for carrion into a joint venture. Instead of searching on their own, some young ravens form bands of as many as 30 birds.

“This behaviour in young ravens has not been documented before, and came as a surprise to us. But the fun was that our game theory model predicted this behaviour as an alternative strategy for young ravens”, says Jonathan Wright, a biology professor at the Norwegian University of Science and Technology (NTNU).

Wright has been studying the behaviour of young ravens in Wales with his colleague Sasha Dall, of the University of Exeter in Cornwall.

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Ravens feed on the carcasses of large animals. In rural areas in Wales, this basically means sheep. Adult raven pairs defend the cadavers that are found in their territories, while young ravens gather in large, communal roosts - like youth hang-outs - and cooperate extensively in their hunt for food.

Wright and Dall studied one of the world’s largest roosts for these birds,

with roughly 2000 ravens. Their study reinforces the theory that the roosts act as information centres where the birds share information about where to find food.

Chase off older birds

“It is most common for young ravens to look for food as individuals. Their efforts can then be combined to cover a large area. In the evening they return to the roost. The birds who have found a dead sheep to tell the other birds about share this information with a sort of flight demonstration of how far away the food is”, says Wright.

The birds recruit six or seven mates, and fly off the next day to the carcass, chase off the older bird pair, and help themselves to the food. The day afterwards, six or seven young ravens return to the carcass, and the process continues until the food is eaten up.

The territorial, nesting pair will defend their areas. But there is little they can do against a hungry mob of young birds.

“The adult pair that has been chased away stays in the background until the young birds are done for the day and have returned to the roost”, Wright says.

Hanging out with their mates

The researchers set out sheep cadavers at different distances from the communal roost, and put small plastic beads into the flesh, with different colours for each carcass.

“A crappy job, it was nice to have students to do this”, says Wright, smiling.

The ravens ate the meat with plastic beads, and when they returned to the roost in the evening, the beads were regurgitated. The different colours of the plastic beads documented quite clearly that ravens that had eaten from the same cadaver also stayed at the same roost.

“While we observed this, we also found these gangs of birds that behaved in a completely different way. Instead of searching one by one, they hunted for food together, in a party of perhaps 30 birds. These gangs hunted near the roost. Because they covered a smaller area, they didn’t have the same need to split up to hunt for food. As a bunch they could easily chase away a nesting couple from a cadaver, and they did not need to wait a day for the first bird to recruit other young ravens from the roost.”

Young couples

The researchers found clusters of plastic beads of the same colour a little away from the main area where the rest of the young ravens were gathered. The gang had thus roosted a little away from the other birds.

“I think that the gang consists of slightly older young birds that have already formed couples. They are sort-of ‘engaged’, but not yet ‘married’, because they have not found a free nesting territory. But this is only a theory,” says Wright.

Predicted by theory

Dall and Wright used a game theory mathematical model to predict how the young ravens would behave.

“Our model had foreseen both an individual exploration strategy for food far away from the roost and a gang strategy for food near the roost.

We predicted that the gang strategy would be optimal where there is usable food near the roosting area. But we first thought that part of the model was wrong, because no one has observed these kinds of raven gangs before," says Wright.

Game theory uses abstract mathematical models to analyse different players' choices between alternative strategies. It is commonly applied in economic theory, but also in subjects such as political science, sociology and anthropology.

And now in biology.

"We have long used game theory in evolutionary biology research, when we study behavioural development in an ecological context. But the raven study is a very good example of how game theory can help understand how behaviour and social structures may evolve under changing conditions. And it's especially funny that it could predict a behaviour that had not yet been observed in reality", says Wright.

Source: Norwegian University of Science and Technology