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SOME NOTES ON BIRD BEHAVIOR

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SOME NOTES ON BIRD BEHAVIOR

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The following is a collection of observations illustrating various phases of bird behavior. Some are from experiments on caged birds, others from the wild. They were made while I was with Archbold Expeditions in 1940 in southern Arizona

and in 1941 at the Archbold Biological Station, Lake Placid, Florida. Originally these observations were to serve as the basis of further research, but with the interruption of the work for an indefinite period it is advisable to publish them thus.

AMOUNT OF CARE AFFECTS DURATION OF BEGGING

Most young birds at first are fed by the parent, and later independently feed themselves. This involved a change in the behavior of both the parent and the young bird.

There is some evidence that change in the behavior of the parent could influence this change in the young. The work of Holzapfel on starlings (*Sturnus vulgaris*)¹ and Rand on curve-billed thrashers (*Toxostoma curvirostre*)² has indicated that the amount and kind of care hand-raised young birds receive can influence the time of this change to self-feeding. Herrick (1935, Wild Birds at Home) has recorded a hand-raised cedar waxwing (*Bombycilla cedrorum*) that never learned to feed itself.

There is also, however, some evidence to show that the change to self-feeding in altricial birds is instinctive, and that this change in the young can influence the change in the adult. Miller (1921, Condor, XXIII, p. 45) has recorded a sudden change in linnets (*Carpodacus mexicanus*) from dependent to self-feeding, without change in the care they were given, and I once saw the same in young blue jays (*Cyanocitta cristata*). In some hand-raised curve-billed thrashers, blue jays and Florida grackles (*Quiscalus quiscula*) there came a time when, though they still begged, they tried to avoid having the proffered food put in their mouths. This they did either by

backing up or turning their heads, and it occurred during the period when they changed to self-feeding. Howard (1940, A Waterhen's World) has more definite evidence. He records that the young waterhen's (*Gallinula chloropus*) early refusal to accept food brought by the parent may influence the parent to cease feeding.

The following account of loggerhead shrikes (*Lanius ludovicianus*) deals with an attempt to throw light on this question. Four young shrikes were removed from one nest between May 12 and 14 and raised by hand at the Archbold Biological Station. Within twenty-four hours of being taken from the nest they begged freely at humans. By May 22, when the shrikes were twenty-one days old, the first exploratory pecking appeared, and the young birds, though still begging, began to avoid having the food placed in their open mouths.

The four birds were then separated into two lots of two each, A and B. Each lot was put in a wire-fronted, screen-bottomed cage. The difference in their treatment from then on was that with couple A a dish of food was kept before them and hand-feeding was stopped as soon as possible, while with couple B no free food was made available and the birds were fed by placing food in the mouth, at least seven times a day for the first two months.

There was a pronounced difference in the duration of infantile begging. Couple A at the age of twenty-eight days fed

¹ 1940, Jour. für Ornith., LXXXVII, pp. 525-553.

² 1941, Bull. Amer. Mus. Nat. Hist., LXXXVIII, pp. 213-242.

themselves well, though they still begged when hungry; by the time they were thirty-nine days old they rarely begged, and after the age of forty-five days they were never seen to beg.

Couple B at the age of twenty-eight days showed no change in begging behavior and did not even try to peck at the food presented; not until they were thirty days old did the attempts to avoid food appear. By the time they were thirty-nine days old they only occasionally tried to peck at the food presented and did very little exploratory pecking. When the birds were forty-two days old there was a decrease in the amount of begging, but they still begged at the close approach of a hand and still had the food thrust into their gullets. By the time they were fifty-three days old they made determined efforts to peck the food from the fingers rather than have it thrust into their gullets, and from this time on they attempted to seize the food in their bills and also did considerable exploratory pecking but still begged.

One of each couple was kept alive until mid-December. Then the one from couple A had been feeding itself and had not begged for about six months. The bird

from couple B still begged at the approach of a human and took food from the hand. This bird, since about the fifty-third day, had not had the food placed in its gullet but received it in the bill or had seized it in its bill. Though it still begged at the age of seven and a half months, it could pick up food for itself, as was seen when food was dropped in the cage.

It appears that in some birds the change from dependent to self-feeding is at least partly innate in the young bird, and it is not necessarily initiated by a change in the care the young bird receives. In such birds as linnets, jays, curve-billed thrashers and shrikes the adaptation is present whereby the young bird could initiate the change in the parent-feeding-young relationship, as the young waterhen is said to do.

However, the environmental factors of the amount of care given hand-raised starlings, curve-billed thrashers and shrikes can affect the time of this change, and with the shrike it was put off for more than six months.

Though the young shrike retained its infantile behavior of begging for food, it had also the ability to feed itself, despite the fact that this ability was not necessary.

A BLUE JAY PROFITS BY, BUT DOES NOT LEARN FROM, THE ACTIONS OF ANOTHER JAY

I had two jays (B and NB) in a small flying cage and October 10 put in a small bucket-like container of food swung by a string, about four inches below the perch. One jay quickly learned to pull up the container for the food in it. The string was lengthened to about eight inches, and October 13 the jay was regularly pulling up the container and eating from it. Sometimes five different pulls were made to get up the whole length of the string, each time the string being held under the foot. The jays were regularly given food in the container, and it was soon noticed that only one of the jays pulled it up. From November 6 to 10 special note was taken of this, and it was found that jay B never pulled up the bucket, but it waited until NB pulled up the bucket, then both fed from it.

Thus NB had learned to pull up the

bucket in three days, while B after thirty days did not pull it up but during this time was profiting by NB's efforts.

To determine if B could pull up the bucket I removed NB, leaving B in the cage on November 12. On November 12, 13 and 14 B made little attempt to pull up the bucket but solved the problem of getting food in a different, more direct way, by flying up and hovering beside the bucket to get out a beak full of food. Not until November 15 did the jay B pull up the bucket, and after this it continued to feed by pulling up the bucket.

Here we have an example of a bird not learning to secure food for itself, though perfectly well able to do so, because another bird performed the work necessary. When the other bird was removed, the jay had to learn to secure the food itself, which

it did. But it had not learned from seeing the other bird perform the actions that secured them both the food. Rather, when necessary to secure the food for itself, it

had first tried a different, more laborious method of getting the food and had taken even longer than had the other jay to learn to reach the food in the simplest way.

A QUAIL LEARNS FROM EXPERIENCE

In southern Arizona in May, 1940, I had a dozen incubator-hatched Gambel's quail (*Lophortyx gambeli*). Inadvertently the door of their pen was left open and a road runner (*Geococcyx californianus*) entered the cage. The roadrunner ate three of the quail and seized another by the wing, badly breaking the skin before the quail escaped. This experience had a lasting

effect on the behavior of this little quail. It remained much more excitable than its companions and darted to shelter at disturbances that its companions did not notice.

However, witnessing the death of three chicks and the escape of a fourth had not affected the remaining eight young birds in the same way.

NOTES ON ENEMY RECOGNITION

THE SIGHT OF A GREAT HORNED OWL KILLS ROADRUNNER

The sight of a predator may have a variety of effects, but only once have I recorded the sight of a predator causing a bird to drop dead. In southern Arizona in 1940 I had raised two young roadrunners. To find out their response I had introduced a great horned owl (*Bubo virginianus*) into their cage. The owl walked toward them and the roadrunners fled. The owl then walked about the cage, the roadrunners sometimes approaching it. This was repeated for some time. Finally one retreating roadrunner went behind a box on the floor. The owl went close to the box, and stood peering. The roadrunner, walking around the box, came face to face with the owl, only a few inches from it. The roadrunner turned, lay down, squawked, and died.

EXPERIENCE HELPS DETERMINE WHAT SHALL BE FEARED

A young blue jay, raised in isolation until it was full-grown, was afraid of others of its own species when occasionally introduced between the ages of three and six months to other jays.

Another young blue jay that was brought up from about fourteen days of age with a young screech owl (*Otus asio*) never showed any fear of the owl and lived amicably with it for about six months.

QUAIL RESPOND TO A SINGLE STIMULUS

Near Tucson in May, 1940, I raised an incubator-hatched brood of Gambel's quail. During the few weeks I had them, I found that they always responded to a whistle by all running to cover. The only other sound, vocal or mechanical, that I found to elicit the same response was the high-pitched scream of a small child. This seems to me comparable to a releaser in the sense used by Lorenz.

BIRDS APPROACH INAPPROPRIATE OBJECTS

It is widely known that birds will often approach objects that have no favorable significance for them. Sportsmen have taken advantage of this in tolling ducks, where a rag waved in the air or the antics of a small dog will attract ducks and cause them to swim within gun range. A waving rag will also attract terns, and Miller (1935) has recorded that a waved hat will attract nighthawks.

In 1941, at Lake Placid, Florida, I saw a female purple martin (*Progne subis*) hover over the dark pavement and pick up a white pebble that it soon dropped. Also I saw a full-grown young cardinal (*Richmondia cardinalis*) that was feeding on grain put out for birds, leave the grain and follow a crawling beetle. It pecked at it a number of times until it had crippled the beetle, then left it and continued feeding on the grain.

I have earlier recorded how curve-billed thrashers instinctively approach and peer at a snake (1941, *Bull. Amer. Mus. Nat. Hist.*, LXXVIII, pp. 213-242).

The following are from experiments on hand-raised birds at the Archbold Station: A blue jay that had had no unpleasant experience with snakes was given in its cage a live sixty-inch pine snake. The jay's response was striking. It peered at the snake, watched the head of the slowly moving reptile from only a few inches away and pecked at the head, sometimes apparently trying to catch the snake's tongue. Sometimes it pecked at the snake's body, but more often it hopped along the body or waited until the snake crawled past it, then pecked the snake's tail. This was continued for half an hour, and a similar result was secured at the next trial. A similar response was secured from a hand-raised meadowlark, on its first being presented with the live snake.

The blue jay, without unpleasant experiences with screech owls, also went to, and pecked at, the feathers of a mounted and a live screech owl.

BIRDS AVOID INAPPROPRIATE OBJECTS

Not only do birds approach objects that are dangerous, but they also sometimes avoid objects which they need not avoid. In experimental work at the Station I had blue jays respond in the same manner to screech owl and bobwhite quail mounts and a blue and white balloon. The birds kept the length of the cage from them. Apparently they were unable to distinguish between them.

One of the most striking examples of avoiding harmless objects I saw in Java. A young pied starling was accompanying its parent on the lawn. A large butterfly came near the young bird, and the latter walked away. For several moments the butterfly fluttered about the bird, apparently attempting to light on its head, and each time the starling avoided it by retreating, and kept six inches or more from the butterfly.

CHANGE IN RESPONSES TO THE SAME STIMULUS

In the above two sections I have used the jay and its response to a screech owl in each, both as objects approached and those avoided. The following shows how a jay's response can vary from day to day.

On December 10 a screech owl mount was introduced into a jay's cage. The jay kept the length of the cage from the owl mount.

On December 26 a live screech owl was introduced. The jay stayed well away from the owl.

On December 31 a screech owl mount and later a live screech owl were introduced into the jay's cage. The jay approached each of them, pecked at them and pulled their feathers.

On January 5 the screech owl mount was reintroduced, and the response was like that of December 10.

A similar picture is given by the following data concerning the same jay and a sixty-inch snake.

On December 27 the live snake caused the jay to keep the length of the cage from it. A pickled snake of the same size and species also caused the jay to avoid its vicinity. The next time a snake (the same pickled snake) was presented was December 29, when the jay still kept the length of the cage away, after a few approaches; the snake was left in for three hours, and the latter part of this time the jay stayed the length of the cage from it.

On December 30 three pickled snakes of different species were presented in quick succession, and each was promptly explored by pecking. The same live snake as used previously was then presented. At once the jay approached the slowly moving snake and pecked at it, favoring especially the head and tail. This continued for thirty minutes. The same results were obtained the next morning.

The next experiment was on January 5, when the same live pine snake was used. Now the jay kept well away from the snake, as it did on December 27, and none of its behavior recalls that of December 30 and 31.

The change in response seemed not to be correlated with experience and seemed to check with nothing in the bird's environment.

It has become fashionable to postulate some change in the internal state of the bird to account for changes in behavior. Be that as it may, the following incidents illustrate how the change in one internal state—the amount of food in the stomach—changed the jay's response.

On December 31, 1941, when the sixty-inch pine snake was introduced into the cage, the hungry jay kept hopping about it, trying to catch its tongue, pecking its body and especially the end of its tail, as the snake slowly moved about.

The jay was then fed, and for one hour and ten minutes it largely ignored the snake, hopping about a few inches from the snake or even touching it, peering at it occasionally but not pecking it. Then it perched about six inches above the snake for some time before the experiment was discontinued. Practically the same result had been secured the previous day.

CHANGE IN RESPONSE TO DIFFERENT STIMULI

I have already noted how the blue jay and meadowlark (*Sturnella magna*) responded in a similar manner to a screech owl and to a bobwhite quail mount. The change in responses to the same object on different days made it necessary in testing objects to check back with objects previously tested, to see whether or not the change in behavior was due to the difference in the object or in the bird.

While some strange harmless objects are avoided, not all are. After removing an owl mount that the jay had avoided, I introduced a wad of tow, of roughly the size of the owl. This the jay, after a short time, approached and pecked. But a white and blue balloon of the same size the jay avoided. On another occasion I had introduced a great horned owl mount for the first time. The jay stayed in the far end of the cage. However, when, for a few moments, I substituted a bundle of leafy twigs about the size of the owl and just as strange to the jay, the jay shortly came and

pecked at it. This lack of fear of some strange objects is apparent only if they are motionless. Motion causes avoidance of even familiar objects. I put a block of wood about four inches square and eleven inches long upright in the cage, and in a short time the jay came and began pecking at it. A movable flap was fitted on one side of the block, and when the jay was at the block the raising of this flap by pulling a string sent the jay flying time after time. Similarly a piece of rope lying on the floor of the cage was ignored, but when made to move by pulling on an attached thread the jay avoided it.

An indication of a graded response depending on the size of the object was secured when using small mammals as stimulus objects. The small mouse, *Peromyscus polionotus* (five and one-half inches long), when introduced was vigorously pursued by the jays. Of course there were periods of active chasing by the jays and periods of rest. A larger mouse, *P. gossypinus* (seven inches long), was pursued less often and less vigorously, and a still larger one, a rice rat, *Oryzomys* (twelve inches long), was avoided slightly and not pursued. Within the small mammal range, the size appears to be important in determining what shall be avoided and what pursued.

EXAMPLES OF BIRDS FIGHTING

Speculation as to the fighting of birds has usually centered about the mating activities. However, birds fight at other times, as the following examples show.

On March 25, 1941, I saw a mockingbird (*Mimus polyglottos*) with a white cocoon in its bill, driven from a shrub by a Florida jay (*Aphelocoma coerulescens*). The mockingbird flew a few yards, lit in another shrub and started to beat the cocoon against the branch on which the bird sat. The jay dashed at it again, and the mockingbird fled, dropping the cocoon. The jay then picked up the cocoon from the ground, held it under its foot, pulled it to pieces and ate the contents.

On April 28 I saw the following robbing of a brown thrasher's (*Toxostoma rufum*) nest. I was attracted to the nest by the

noise and fluttering of the birds. Two Florida jays were fighting with the two thrashers about the nest. They were desperately fighting; a jay and a thrasher even went spinning to the ground together and for a few moments lay apparently clutching each other's feet and, breast to breast, pecked each other. Sometimes a thrasher drove a jay a few feet, more often the reverse. I saw no feathers pulled out, but the thrashers became very bedraggled. In a few minutes the jays got the upper hand; one fell nearly to the ground with a thrasher, then chased the thrasher about ten yards, returned to the nest and carried off an egg unmolested. A few minutes later the two jays and two thrashers were fighting again about the nest. Again the jays exhausted and intimidated the thrashers until one jay was able to go to the nest and take an egg unopposed. There was no stealing quietly to an unoccupied nest and purloining an egg.

The quarreling of young woodpeckers is well known. I have raised young cactus woodpeckers and young red-cockaded woodpeckers (*Dryobates scalaris* and *D. borealis*), and they continually fight fiercely amongst themselves. This seems not to be correlated with an attempt to secure food or position, but the proximity of one bird seems to call forth an innate pugnacity in the other. The two red-cockaded woodpeckers I raised were very tame and at feeding time would cling to the front of the wire cage. If food was not promptly forthcoming, one bird would start to fight with the other, lighting on it and pecking it. One of these woodpeckers finally killed the other by a blow on the head.

Two young mockingbirds, nest mates kept in the same cage, also quarreled frequently. They were separated for fear the dominant bird would kill the other. Finally I used the dominated bird in some experiments. Placed with a Florida jay they got along well for a time, then the mockingbird began to quarrel with the jay, flying or running at it and pecking it. Soon it completely dominated the Florida jay, driving it about the cage at will. It did the same with a blue jay (both larger, and usually considered bold, aggressive

birds). Knowing the traditional pugnacity of the woodpeckers I introduced a red-bellied woodpecker (*Centurus carolinus*). It withstood the assaults of the mockingbird for a time, but soon retreated before it. Now the mockingbird was returned to the cage with its nest mate that had dominated it. But the domination was now reversed. The dominated bird became the aggressor.

The mockingbird was then placed with a ground dove (*Columbigallina passerina*). Traditionally inoffensive, the dove would not retreat from the mockingbird but spread its wings in a display that repelled the mockingbird. After some time of frequent attacks the dove began to become aggressive, instead of being strictly defensive. It began to run at the mockingbird when it approached the latter and sometimes drove it the length of the cage. In the dove's fighting the display of the spread wings and the approach were sufficient, without any actual physical contact.

The result of the Florida jay's fighting is easily seen; they got food by it.

The quarreling of the young woodpeckers seems the result of an instinctive tendency. It is interesting to note that the non-arrival of expected food usually caused a quarrel to start.

The quarreling of the young mockingbirds is like that of the young woodpeckers. It is not always specific. The reversal of dominance, when the dominated mockingbird had been allowed to dominate other birds, is noteworthy.

The fighting of the dove and the gradual increase of its aggressiveness seem to be correlated with its being continually attacked by the mockingbird.

BLUE JAY RESPONDS TO TWO STIMULUS-OBJECTS AT ONCE

January 6, 1942, I put a mounted great horned owl in the cage. The jay for forty-five minutes stayed in the far end of the cage, hopping about, pecking at things. Aside from keeping away from the owl mount it displayed no interest in it. For two of these minutes I substituted a bunch of shrubbery, owl size, and the jay at once came to it. Then I placed food at the base

of the owl mount. The jay at once approached to within a few inches of the food, perhaps within six inches of the base of the mount, then hopped back and forth six to eighteen inches from the mount, screaming "Jay" calls. This alert watching, hopping in and out, and screaming looked like "scolding the owl," or "mobbing the owl." This continued for three minutes, when the jay began to dart in occasionally and snatch food; in another minute it was feeding warily at the base of the mount.

Here, perhaps, we have the involved factors showing with some clearness. The sight of the owl kept the jay the length of the cage from it, but the sight of the food at the base of the mount brought the jay closer. Then the jay screamed for some minutes before going warily to the food and feeding.

This demonstrates that behavior can be the result of more than one stimulus at a time. The owl was repelling the jay, the food was attracting it, and the jay responded solely to neither; it approached the owl closer than it would have gone without the attraction of the food and stayed farther from the food than it would have done without the presence of the owl, and hopped back and forth, screaming.

SUMMARY

This paper is in the nature of an annotated list, and as such defies summarizing. As for drawing conclusions, some of the results are plain, while others do not fit into any pattern and are presented as contradictory results that need investigating.

Some of the points brought out are:

Young shrikes have an instinctive tendency to become self-feeding, but excessive, unnatural care can prolong begging for at least six months.

A blue jay profited by the work of its cage mate but did not learn from it.

A young quail learned from painful experience.

The sight of a great horned owl killed a roadrunner.

A young jay raised in isolation feared its

This type of behavior in the wild, directed toward an owl, is so common as to be considered characteristic of jays. It is often called "mobbing a predator."

May not some of the above notes have implications in respect to the scolding or mobbing of a predator in the wild, such as an owl? I have shown above how a jay would sometimes approach and even peck at a screech owl and a snake in an exploratory manner. At other times it avoided the owl and snake. May not the scolding of such predators, as seen in the wild, be the result of two conflicting tendencies, the one to approach, the other to avoid, as I demonstrated with the jay, the great horned owl mount and the food? This explanation recalls that of Friedmann (1934, *Psychol. Rev.* XXI, pp. 1-57) for the injury-feigning of birds. He suggested that it resulted from the conflict between a tendency to return to the nest and one to flee the marauder. Though Friedmann's views on this were not well received, I venture to put forward this somewhat similar idea in regard to mobbing.

The behavior under these circumstances could thus be classified with a similar series of activities that Tinbergen (1939, *Amer. Midland Naturalist*, XXI, pp. 211-234) has listed as substitute behavior, and Rand (Auk, in press) as irrelevant behavior.

own kind; a jay raised with a screech owl lived amicably with it.

Young quail responded to a releaser-like stimulus, a whistle, by running to cover.

Many birds approached, and some pecked at, inappropriate or even dangerous objects.

A jay responded similarly to an owl and a quail mount and to a balloon.

From day to day a jay's responses to an owl and to a snake varied greatly, without apparent correlation. Hunger made a difference in a jay's response to a snake.

Jays avoided some harmless, strange objects but not others. Motion caused avoidance of otherwise ignored objects. The size of small mammals determined whether they would be chased or avoided.

Twice Florida jays were seen to fight to secure food. Young woodpeckers and mockingbirds had quarrelsome dispositions. The non-arrival of expected food caused woodpeckers to begin fighting. A period of absence and despotism caused a mockingbird to change from a subordinate to a dominant bird. A ground dove became aggressive only after being repeatedly attacked by a mockingbird.

When food was placed at the base of a great horned owl mount that a jay was avoiding, the jay approached and screamed, being repelled by the owl but attracted by the food. It is suggested that the conflict of exploratory tendencies and avoiding tendencies, resulting in substitute or irrelevant screaming, may be what is known as "mobbing a predator."