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# The mentality of birds

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Birds have been described as resembling "highly emotional people with very little brain." (Oscar Heinroth as quoted by Lorenz 1935, p.123). They seem to communicate the joy of being alive. Ornithologists such as Thorpe (1961) and Armstrong (1973) debated whether or not the birds themselves have a highly developed aesthetic sense. For present purposes we will define aesthetics as the ability to translate beauty into emotion, emotion into beauty, and with Armstrong, declare for the affirmative.

Many observers have claimed that bird song becomes more beautiful when the bird is emotionally aroused. In one male Pied Flycatcher (*Muscicapa hypoleuca*) the number of songs per day decreased from 3,620 to 1,000 when he acquired a mate (van Haartman, 1956; as cited by Armstrong, 1973). In those areas where territory is abundant and females are scarce, the territorial song tends to disappear. Frequently the courtship song is a sweeter version of the territorial song although in other species it is entirely different. In those species where the role of the sexes is reversed, as in the Painted Snipe (*Rostratula benghalensis*), it is the brightly colored female that sings. Marshall (1954) speaks of the Satin Bowerbird (*Ptilonorchus violaceus*) as involving "astonishingly complex, and, to some degree, aesthetic reproductive mechanisms." Although as much might be said of many birds (quoted by Armstrong).

The male of many species is known to have a whisper song. During this performance he sits and sings very soft song variations. Thorpe (1961) regarded all sub-song as playful exercise and non-communicative in nature, but Armstrong (1973) cited examples that indicate that no such demarcation is possible. Some females are known to have a soft nest song. This song has an effect on the unhatched young, as shown by Hess (1972) in the nest calls of Mallards (*Anas platyrhynchos*).

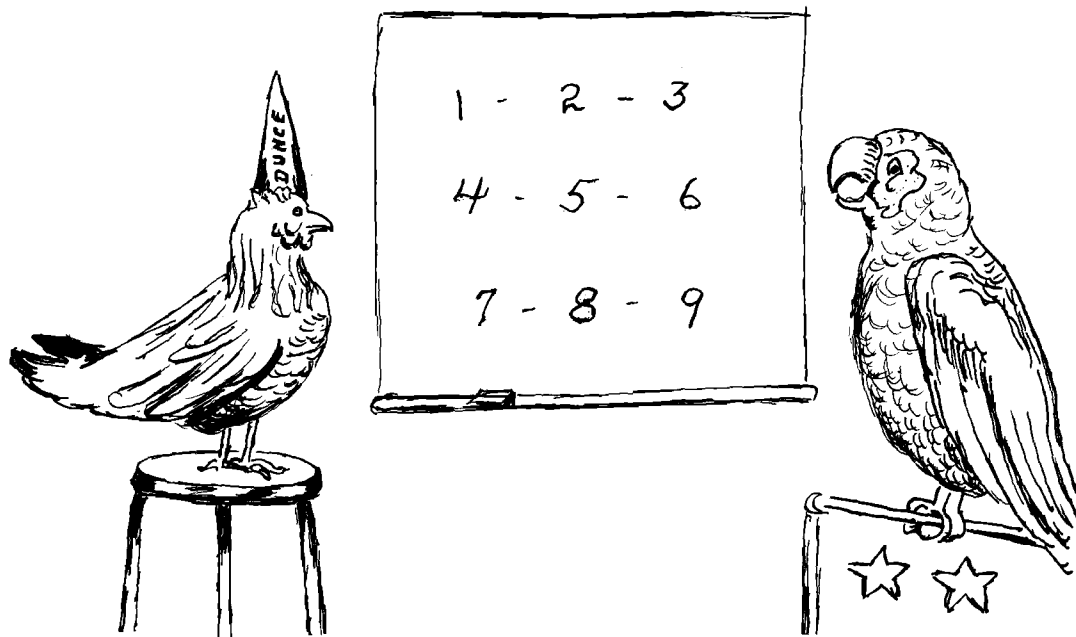
Sound spectrographic analysis has shown that some birds such as the Blue Jay (*Cyanocitta cristata*), Brown Thrasher (*Toxostoma rufum*), and Mockingbird (*Mimus polyglottus*) sing two notes at the same time. This is sometimes referred to as an 'internal duet.' It has long been suspected that they

do this. I have found that if the song of the Wood Thrush (*Hylocichla mustelina*) is played repeatedly at one quarter speed, one may hear two to four notes simultaneously. This technique used with the Rufous-sided Towhee (*Pipilo erythrophthalmus*) also reveals how many notes the human ear misses. Natural selection alone could not have resulted in such an elaborate vocal apparatus and the tendency to use it. Thorpe (1956) commented that these "aesthetic improvements in bird song go far beyond what biological necessity requires."

How is the intellectual capacity of animals measured? One procedure determines the non-verbal counting ability of the animal. By this measure the domestic chicken seems to be among the least intelligent of all fowl. The hen can learn to count to three. Morgan (1956) relates an experiment done by gluing down some grains of corn in a row, leaving every third grain unglued. The hen learned to skip two and take the third. The hen was scared away each time after taking three grains. She learned to stop eating after three grains. Otto Koehler found the parrot to be the most intelligent bird tested by this method. It counted to nine. Food was placed in closed containers in a row and the parrot learned to skip eight and open the ninth. Koehler also related that the parrot nodded its head as it went down the row. One day as it was performing its task there was a knock at the door. The parrot seemed to have lost its place and went back and started all over (personal communication as told by E.H. Hess).

Koehler (1950) found that the Parakeet could match the number of spots on the lid of the food container with those on a key card up to seven. When the shape of the spots was changed from circles to squares, the Parakeet could still match correctly. An elephant could not, and had to relearn the task completely (Rensch, 1957).

David E. Davis and I once did an experiment in counting, involving five pairs of naive, one-year-old Mallards in isolated pens. Each pair was used three times in the same year in each procedure. As soon as the duck in one pen made a nest and laid the first egg, I added nine. She quit laying and started incubating. In the second group, as soon as the duck began to lay, I would remove all the eggs



but one. The duck continued to lay as many as thirty eggs before she either deserted the nest or sat on one egg. As the season advanced the tendency to sit on the one egg increased. The control groups laid eight to ten eggs. (The normal time of hatching in the Mallard varies from 24 to 28 days.) It must be noted that in some species the number of eggs produced is determined by heredity alone. When the first egg was removed from a Mourning Dove (*Zenaidura macroura*) nest, she laid only one additional egg. In a misalliance between two female Pigeons (*Columba livia*) there were four eggs in the one nest. I could never get a pigeon to incubate longer than 18 days although some species tend to set until the eggs hatch.

Another method of testing intellectual capacity is known as double alternation. A pigeon, for example, can readily learn to go to a door marked with a triangle for food one time, and to one marked with a square the next. However, it cannot learn to go to the triangle twice in a row and then to the square twice. Neither can a three-year-old child (Morgan, 1956). By such procedures we learn that even baby chicks can discriminate between different types of geometric figures, even when the size is reduced to 0.9 mm or less.

A third procedure used in measuring higher intelligence is called detour behavior. A cage with one side open is used. Food is placed outside the cage at the closed end and the subject is placed inside the cage near the food. The animal with higher intelligence will run all the way around to get its reward. An octopus, the invertebrate animal with the largest brain, can do this. A bird cannot.

However, birds seem to excel in observing details. In the hidden bowl experiment, the subject is allowed to eat from one of two similar bowls. Both bowls are then moved behind a screen, one to the right and one to the left. To solve the problem, the subject must go around the screen to the correct bowl. The several species of Corvidae tested could do this readily. Cats could not. (Stetter and Matyniak, 1968).

All animals have simple intelligence—the ability to profit from experience. If the Paramecium, a one-celled animal, is placed in a capillary tube, it will slowly reduce its escape time from several hours to several minutes. Stetter and Matyniak (1968) cite several experiments showing that birds excel at learning from experience. One such experiment involves multiple reversals. After an animal has learned to choose between two symbols such as a square rather than a circle to get food, the 'correct' symbol is reversed. The animal's intelligence is measured by the number of trials it takes to learn a series of such reversals. The pigeon does as well as the laboratory rat and many birds do better. On the whole birds do at least as well as many mammals.

Discriminative learning has been used many times to test the sensory ability of animals. A chick can be trained to peck at a blue disc instead of a green one for a food reward. The wave length of the color can be gradually changed until the chick can no longer discriminate. By these tests we have learned that the visual acuity of birds is at least as good as that of man. The hearing ability of birds is better than man's but the range is shorter.

Greenwalt's (1969) measurements of time perception in bird and man showed that the bird's perception was fifty to one hundred times better than man's; much of the beauty of bird song is lost to the human ear. Much that appears to birds as discrete sounds appears to man as a blur.

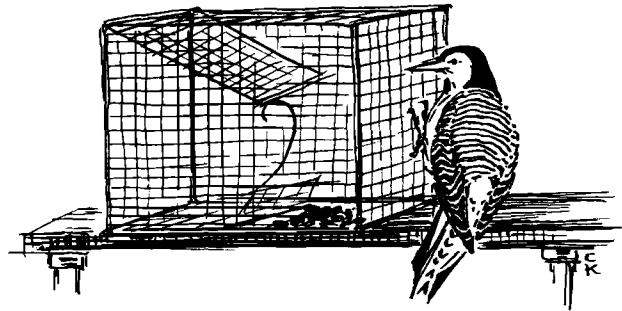
Konrad Lorenz in his 1935 paper emphasized that birds must learn many things to supplement their instinctive behavior. This learning occurs so rapidly and in such a special sensitive period in an animal's life that Thorpe (1961) thought it constituted an entirely different kind of learning similar to, if not identical with, imprinting. Bird society, even more than human society, is based on individual recognition. Precocial baby birds must learn to recognize their own mother by nightfall or their chances of surviving the night are remote. They cannot keep themselves warm. In my experiment with baby chicks (1951) I found they could discriminate between the calls of two hidden parent hens. Two broods of the same age were mixed together and released simultaneously. Only one chick went to the wrong parent, but, to my astonishment, it soon came running back out and went to its own hidden parent. The most striking example of personal recognition was described and filmed by Sladen (1957). In colonies of thousands of Adelie Penguins (*Pygoscelis adeliae*) the adults feed only their own young. They lead them away from the communal nursery and feed them by regurgitation.

This individual recognition is based primarily on auditory cues and differences in song pattern. Brooke Meanley in his 1971 study of Swainson's Warbler (*Limnothlypis swainsonii*) stated that he learned to recognize the different males in his study area by their songs alone. Borror's 1967 phonograph record provides as many as ten versions of the songs of 60 different species. Borror and Reese (1969) claim that they have recorded 102 different songs for the Mockingbird and that sound spectographic analysis shows that his imitation of such species as the Carolina Wren (*Thryothorus ludovicianus*) are very precise. Hole-nesting species demonstrate recognition by voice. The females will come out at the call of their own mates but will not respond to that of other males. Territorial males will respond to the call of a strange male played in their territory, but will ignore calls of neighbors to whom they are accustomed.

The American Robin (*Turdus migratorius*) often responds to the challenge of a strange male not by singing its own song, but by singing the song of the challenger. Similarly, a female may respond to the

call of her mate by repeating his call precisely. I had one pair of hand-raised Blue Jays that learned to duet. One would call one note and the second would respond so quickly that it sounded like a single bird calling. Duetting is found in a number of species.

Bird song is another example of inherited behavior supplemented by learning. The Northern Oriole (*Icterus galbula*) song seems to be entirely learned. If reared in isolation in a sound-proof room, the oriole will invent a song of its own and transmit it to its offspring (Scott, 1972). It will, however, even in isolation learn the Northern Oriole song if it is allowed to hear one. This is also true of the White-crowned Sparrow (*Zonotrichia leucophrys*) although its close relatives reared in captivity come up with what is recognizable as a species-specific song (Armstrong, 1975).



Different geographical races frequently acquire an entirely different song. The Eastern Meadowlark (*Sturnella magna*) and the Western Meadowlark (*Sturnella neglecta*) have quite different songs and rarely interbreed. Lanyon (1957) records one exceptional male that had two mates: one Eastern and one Western. Somehow he had learned the songs of both species. By contrast, the Yellow-shafted Common Flicker (*Colaptes auratus*) and the Red-shafted Common Flicker (*Colaptes cafer*) commonly hybridize. Such occurrences emphasize the role of song in species recognition (Lanyon).

I have had several groups of hand-raised Blue Jays that learned call notes that I whistled to them even though they could hear the calls and song of the wild jays in the immediate neighborhood. (Special Permit 11581 allowed me to keep certain species in captivity.) We do not know what stimulates birds to imitate, but it is a tendency during the first three months of their lives. One theory is that mimicry occurs with emotional rapport. I have never been able to get hand-raised Mockingbirds. Catbirds (*Dumetella carolinensis*) or Starlings (*Sturnus vulgaris*) to imitate my whistle though each has been known to do so spontaneously in the wild (Bent, 1964; Armstrong, 1973). Canaries and

Starlings have been taught popular melodies by the use of a bird whistle or flagolet. Mozart transcribed the acquired song of the Starling and is thought to have used it in one of his musical compositions.

Associative learning is evidently involved in mimicry. There are so many records of bird mimics, such as the Blue Jay giving the call of a hawk when a hawk appeared overhead (as if the bird called the hawk by name), that we can hardly attribute them to mere coincidence. Armstrong (1973) cites a page full of such observations.

H. and M. Frings (1958) have shown that learning is involved in response. The American Crow (*Corvus brachyrhynchus*) that breed in Pennsylvania and winter in the south among Fish Crows (*Corvus ossifracus*) respond not only to the calls of the Fish Crow but also to those of the French Jackdaw (*Corvus monedula*). Those non-migratory American Crows that live in Maine will not respond to the calls of either of these species but do respond to the calls of the Herring Gull (*Larus argentatus*) with whom they are associated. The Herring Gulls of France do not respond to the calls of the American Herring Gull. The Black-backed Gulls (*Larus fuscus*) of America respond to the calls of the Herring Gull, but those of France do not.

All birds have a language that not only communicates emotional states but also specific information such as danger overhead, danger on the ground, food, or mob call. The number of calls varies from 5 to as many as the 23 claimed for the Bob-white Quail (*Colinus virginianus*). The average is about 8. These calls have been found to be similar in different species (Marler's data as discussed by Thorpe, 1961). I had no difficulty in teaching Mallard ducklings to respond to an arbitrarily selected danger call. In fact some of them did so after a single experience (1971). I could never prove that one of my Blue Jays called the notes I taught him when he was lonely. I can only say that sometimes his call sounded pathetically sad and lonely and, if I went to him, he would flutter all over me.

In my experiences with hand-raising birds I found that Mockingbirds, Catbirds, and Starlings did not become as attached to me as did the Blue Jays. My most recently acquired Blue Jay was rescued from the jaws of a cat as a fledgling. Unlike other Blue Jays that had been raised in groups, it was strongly imprinted on me. When fully grown and independent, it would alight on my wife's shoulder or foot as she worked in the garden or follow her about. It

would follow me into my shop and sit on a chair singing softly in conversational notes for a half hour or so. Strangely enough it showed absolutely no fear of cats or other creatures and I doubt if it survived many months in the wild. In contrast to this, my imprinted American Crow, although he will not associate with other crows, will scold and dive at cats.

The location of home territory is obviously learned by the use of landmarks. Tinbergen (1953) moved the landmarks from around a Herring Gull nest to an artificial nest nearby. When the gull returned, it sat on the empty nest in the new location. If the eggs and its own original nest were two feet away, the gull might move over to the first nest after about a half hour, or retrieve an egg, but would not sit on the original nest permanently. Tinbergen found that these birds do not recognize their own eggs. In a series of choice test situations he varied the color, size, markings, shape, and number of eggs in two nests situated side by side. His conclusion as to his experiments with color are characteristic of his findings. He writes "the gulls were not (or scarcely), even in the extreme situation conditioned to the exceptional color of their eggs, but is seemed also to indicate that the normal color did not play a part in whatever "knowledge" of the eggs there might be."

It is not yet clear what part learning plays in other instinctive activities such as the selection of a migratory route, the recognition of enemies, and in food preferences. However, it seems reasonable to assume that these will vary greatly from species to species as has been shown to be the case in other areas.

The studies and experiments reviewed above emphasize that there are different kinds of intelligence. In simple learning situations birds compare very favorably with mammals. They clearly exceed the latter in the use of their visual and auditory powers. ♣

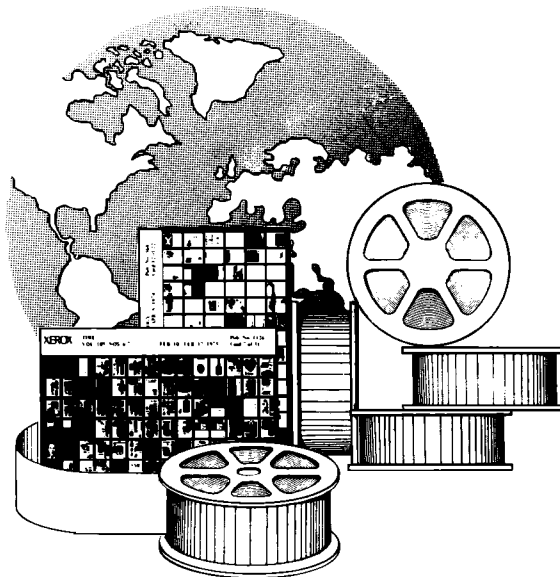
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