

the mirror than more subordinate birds. This hypothesis was not supported ( $P > 0.05$ , Kendall's tau).

The way in which a chickadee responds to its reflection depends in part on its past experiences in agonistic encounters and is reflected in its dominance rank. Birds that were more successful in winning contests were more likely to threaten the mirror, although threats were not confined to the most dominant birds as some males of mid-rank threatened the mirror. Even dominants tended to take fewer seeds when confronted with a mirror, indicating that they were somewhat intimidated.

A number of experiments with birds have employed models (e.g., Lack, *Life of the Robin*, Penguin Books, London, England, 1953; Dilger, *Auk* 73:313–353, 1956). A model is an unchanging stimulus, while a mirror reflects the animal's behavior exactly, except for vocalizations. Thus, a dominant bird sees one responding like a dominant, a subordinate sees one that acts like a subordinate. For birds with visual individual recognition the image would be a stranger. Mirror experiments are often difficult to interpret (Smith, *The Behavior of Communicating: An Ethological Approach*, Harvard Univ. Press, Cambridge, Mass., 1977), but they do show what an animal will do when confronted with an animal that looks and acts like itself. However, the image does not act like a copy because vocalizations are not returned, and this may be a very important difference for a species such as the chickadee which uses vocalizations frequently in agonistic encounters. However, our data show that chickadees will threaten a visual stimulus that is not accompanied by a vocal component.

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**Tool use by Green Jays.**—Tool use by birds has usually been defined as the manipulation of inanimate objects so as to extend the physical capabilities of the bird (Morse, *Behavioral Mechanisms in Ecology*, Harvard Univ. Press, Cambridge, Massachusetts, 1980). Corvids that use tools include the New Caledonian Crow (*Corvus moneduloides*) (Orenstein, *Auk* 89: 674–676, 1972), and laboratory-reared Blue Jays (*Cyanocitta cristata*) (Jones and Kamil, *Science* 180:1076–1078, 1973). Here I report tool use in the Green Jay (*Cyanocorax yncas*).

While studying this species at the Santa Ana National Wildlife Refuge near Alamo, Texas, I saw use of "tools" by a family of adult and juvenile Green Jays on 6 June 1981. I first observed an adult Green Jay (sex unknown) on the ground pick up a small twig in its beak and fly to a branch of a dead tree approximately 4 m above the ground. The bird inserted the twig under a piece of bark and moved it back and forth for approximately 5 sec. The jay then withdrew the twig, placed it under its feet, and proceeded to consume an insect that was attached to the twig. The bird then reinserted the twig under the bark and repeated the sequence of events four consecutive times, lasting about 2 min. The jay dropped the twig and flew a short distance to another tree. A few minutes later, the same adult flew back to the branch with another short twig in its beak and again inserted it under the bark. This time, however, the bird pried off a piece of bark, dropped the twig, and consumed the exposed insects. Whether the jay intentionally used the twig as a lever in this instance is unknown, since this behavior was not observed again.

A juvenile Green Jay attempted to use twigs to capture insects in a similar manner. One

of the apparent offspring (which had been seen begging for food earlier) of the previously mentioned adult jay picked up a twig and flew to the same branch on which the adult had been feeding. The juvenile inserted the twig several times under pieces of bark and removed it each time but did not capture any prey item. The total time spent attempting to feed in this manner was about 45 sec. The bird then dropped the twig, flew to the ground, picked up another twig, flew back to the same branch and tried again. After three unsuccessful attempts lasting about 2 min, the bird dropped the twig and flew to another tree. Due to the inaccessibility of the branch on which the jays were feeding, the types of insects being consumed were unknown.

To my knowledge, this is the first report of apparent tool use by wild jays. Of 14 individuals for which feeding data were collected, only these two birds were observed using tools and approximately 5% of the feeding observations for them involved tool use.

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**A flight-song display of White-throated Manakin.**—The White-throated Manakin (*Corapipo gutturalis*) is known in northeastern South America from the Guianas, Venezuela, and northern Brazil (de Schauensee, *The Species of Birds of South America*, Livingston, Wynnewood, Pennsylvania, 1966). The species favors hilly forest in Venezuela, between 250 and 1100 m elevation (de Schauensee et al., *A Guide to the Birds of Venezuela*, Princeton Univ. Press, Princeton, New Jersey, 1978). In Suriname the species is known from Brownsberg and Nassau Gebergte (Mees, *Zool. Mededelingen* 48:55–67, 1974). I have found White-throated Manakins fairly common at Brownsberg above 200 m from January–April and in November. It is a small, unobtrusive bird, foraging arboreally in small groups or among mixed flocks of honeycreepers and tanagers. The White-throated Manakin's presence is best betrayed by its foraging call, a high-pitched *SEE·see* or *SEE·see·ee·e*, uttered by both sexes.

Davis (*Ibis* 91:146–147, 1949) described White-throated Manakin displays from Guyana. The displays he observed involved a group of 6–12 birds of both sexes. At first, males displayed from tree branches between about 3–15 m above the ground, frequently chasing one another. Several times a male crouched with his bill pointing straight up, displaying the white throat. When a female flew down to a fallen tree trunk she was joined by a male and copulation took place without further display. Later, a female came to the log where she was joined by a male who crouched with wings fully spread horizontally and approached her with a slow and labored undulating crawl. The male's posture revealed the white wing bar at the base of the primaries. This display was interrupted by another intruding male. No calls were uttered by any of the birds present throughout the chases and displays. No further displays were noted at this spot later the same day or the next morning.

On 15 November 1979 M. Weinberger and I witnessed a male White-throated Manakin engaged in flight song display at Brownsberg. The display was remarkably like that given by male Common Yellowthroats (*Geothlypis trichas*) except that it took place above forest canopy rather than over dense, low cover.