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NOTES

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CONTEXT OF BLUE JAY (*Cyanocitta cristata*) MIMICKING COOPER'S HAWK (*Accipiter cooperii*) CACKLE

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At about 0730 EDT on 15 September 2008, I observed the circumstances of a Blue Jay (*Cyanocitta cristata*) uttering an imitation of the "cackle" or "cak-cak-cak" call of the Cooper's Hawk (*Accipiter cooperii*) at my home in the town of Jupiter Inlet Colony, Palm Beach County, Florida. The context suggests the broadening of a previously stated hypothesis concerning the use of raptor imitations by this jay species (Hailman 1990).

I observed at least four individuals moving around in fairly thick cover, one being at our bird feeder when a different bird uttered the single Cooper's Hawk cackle. The bird on the feeder flew and was immediately pursued by another individual although there was no way to tell if this was the individual that had given the call. In the several minutes that followed, much moving in the vegetation was evident and at least two other aerial chases occurred. During these interactions no vocalizations loud enough for me to hear were given, and eventually all the jays disappeared.

The Blue Jay may be one of the few avian species that selectively imitates the calls of raptors. Tarvin and Woolfenden (1999) list literature reports of mimicry of three *Buteo* species, one falcon, the Osprey (*Pandion haliaetus*), as well as Fish Crow (*Corvus ossifragus*) and Eastern Screech-Owl (*Otus asio*). Imitations of the Cooper's Hawk were also listed (as Tarvin unpublished and C. S. Adkisson pers. obs.) although the type of call was not specified. According to Rosenfield and Bielefeldt (1993) an unpublished dissertation by H. K. Meng reported 64 distinct adult calls, but Rosenfield and Bielefeldt (1991) reduced those to four categories, of which the *cak-cak-cak* or "alarm" call is heard most often.

Four previously offered hypotheses about raptor-call mimicry (Hailman 1990) were (1) warning to companions of the presence of a raptor, (2) warning that a raptor was previously at this place (and hence might still be in the area), (3) deception of other potential prey species causing them to desert a resource desired by the jay, and (4) random mimicry of sounds in their environment. The last seems unlikely, as Northern Mockingbirds (*Mimus polyglottos*) in the same area mimic all sorts of other sounds of the environment, but rarely any raptor sounds, and the jays rarely if ever utter any of the imitations that the mockingbirds use. Tarvin and Woolfenden (1999) added hypothesis (5), that raptor calls are "native to the repertoire of jays," also an unlikely possibility as no jay has been reported to mimic a raptor that does not occur locally with the calling jay. The fact that jays sometimes give raptor calls when suddenly encountering a human being (pers. obs. and mentioned by Tarvin and Woolfenden 1999) constitutes a broadening of hypothesis (1) to warning of any imminent danger.

Hypothesis (3) seems to have received the most independent support. Loftin (1991) relates a personal report from S. L. Sutton of a jay giving the call of the Red-shouldered Hawk (*Buteo lineatus*), causing a Boat-tailed Grackle (*Quiscalus major*) to drop a piece of bread from its bill and flee, whereupon the jay swooped down and ate the food. Further and more detailed substantiation was provided by Clench (1991) from a feeder in Texas. Blue Jays repeatedly frightened other species from a feeder by uttering Red-shouldered Hawk calls, but they never gave such calls if approaching the feeder when no bird was on it.

My observations reported above serve to broaden hypothesis (3) to include frightening conspecifics to take flight. Nevertheless, I need to mention that 3 days previous to

this occurrence, a Cooper's Hawk perched on a utility wire near the feeder and gave a cackle call before flying away. Whether this hawk was detected by Blue Jays in the vicinity I do not know, but if so, then the hawk mimicry I subsequently observed would also constitute support for hypothesis (2).

As pointed out by E. Goodale (in litt.) the jay's raptor calls may be part of a more widespread phenomenon in that some species are known to imitate the alarm or warning calls of other prey species. The Violaceous Euphonia (*Euphonia violacea*) incorporates such heterospecific calls in its singing (Snow 1974), but more specifically the congeneric Thick-billed Euphonia (*E. lanirostris*) is known to utter alarm calls of other species when alarmed itself (Morton 1976). The Greater Racket-tailed Drongo (*Dicrurus paradiseus*) incorporates both raptor calls and alarm vocalizations of other prey species in its own alarm vocalizations (Goodale and Kotagama 2006). Chu (2001) reports similar findings in the Phainopepla (*Phainopepla nitens*).

Goodale (in litt.) further suggests that "young may learn to associate calls of predators with danger, if they instinctively respond to the species-specific alarm calls of their parents." This suggestion is related to a long-standing one in the literature perhaps first articulated by Thorpe (1956: 121) in which young learn to recognize predators when their parents respond alarmingly in a predator's presence. This recognition is further generalized when the young give displays and calls like those of their parents in the presence of but not initially directed to the predator, as known in Northern Mockingbirds (Hailman 1963). So by secondary conditioning young learn to give their species' displays and calls to predators, possibly also learning the calls themselves. Then if other prey species are also calling or the predator itself is calling, the young may incorporate those vocalizations in its own alarm repertoire.

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