DISTRESS CALLS IN BIRDS: AN AVIAN ENIGMA

by William E. Davis, Jr.

In a previous *Bird Observer* article (1987), I presented the hypothesis that birds respond to "psh-psh-psh" human calls because these noises resemble avian distress calls. In this article, I focus on the avian distress calls. A future article will discuss the evolution of these calls.

The high-intensity alarm calls emitted by birds when they are removed from mist nets, captured, or attacked by predators have been variously referred to as "distress calls," "squeals," "squalls," "screeches," or "screams" (Norris and Stamm 1965). Every birdbander has heard a catbird's shrieks when it is removed from the mist net or trap, and these same cries have been emitted by birds when in the grasp of predators. Boudreau (1968) has even demonstrated that emotional as well as physical stress can evoke this kind of response. In separate experiments he released a well-fed Sharp-shinned Hawk into cages with European Starlings, Northern Flickers, Acorn Woodpeckers, Western Meadowlarks, and Western Bluebirds, and they responded by emitting typical distress calls, even though the hawk did not attack them.

Distress calls are typically harsh (covering a wide range of frequency or pitch), loud (high amplitude), and repetitive (at half-second to one-second intervals). They may be uttered for several minutes without interruption. These characteristics make the location of the caller easy to detect (Marler 1955). All these calls are remarkably similar in sonic structure, even among birds with very different evolutionary histories (Figures 1-7). Birds that emit distress calls are found among a wide variety of orders including the Galliformes (e.g., quail), Charadriiformes (shorebirds), Columbiformes (doves), Psittaciformes (parrots), Apodiformes (hummingbirds), Coraciiformes (kingfishers), Piciformes (woodpeckers), and Passeriformes (perching birds).

Distress calls have been largely ignored by researchers until relatively recently, despite the interesting questions they pose. Why do birds emit these calls? Are they adaptive -- that is, do they give the caller some advantage that enhances the probability of its survival? Or are they merely an artifact of some other behavior with no evolutionary significance? For example, the screams emitted by a person falling from a twenty-story building do not confer any survival advantages over a person falling from the same height who does not scream. Nonetheless, screaming may, in our evolutionary history, have had a survival advantage, such as the scream of a child to signal its parents that it is in trouble.

Figures 1 through 7 are sonagrams (wide band) of distress calls emitted by a variety of birds while they were being removed from mist nets. The horizontal axis measures time in seconds, and the vertical axis measures kilohertz or thousands of cycles per second. The latter is a measure of frequency or pitch. The darkness of the tracings gives an indication of amplitude or magnitude of the sound produced. All the distress calls have the following in common: they are harsh (they cover a wide range of frequencies), repetitive, easy to locate, and signal, "Here I am!" The calls are structurally quite similar considering that the species represent a variety of families, geographical areas, and evolutionary histories.

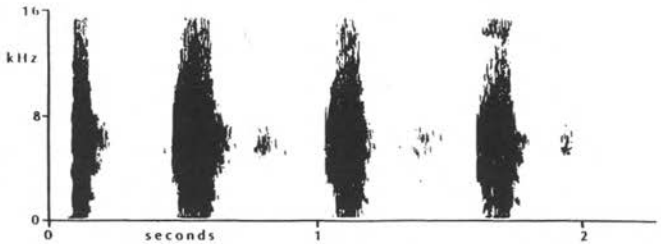

Figure 1. White-cheeked Honeyeater, *Phylidonyris nigra*, banded near Sydney, Australia

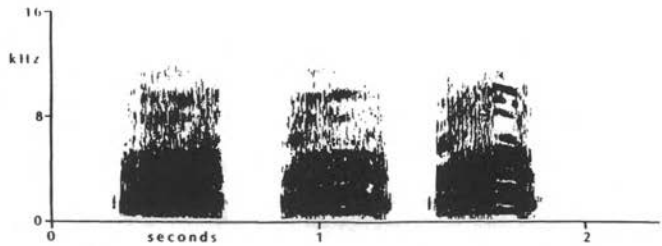

Figure 2. Laughing Kookaburra, *Dacelo novaeguineae*, banded near Sydney, Australia

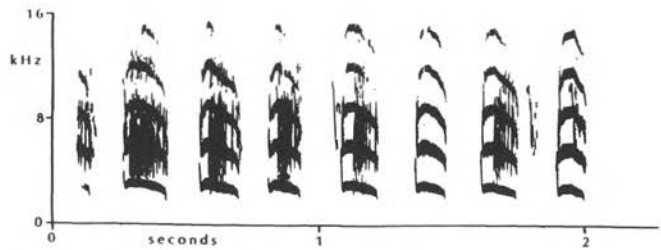

Figure 3. Variegated Wren, *Malurus lamberti*, banded near Sydney, Australia

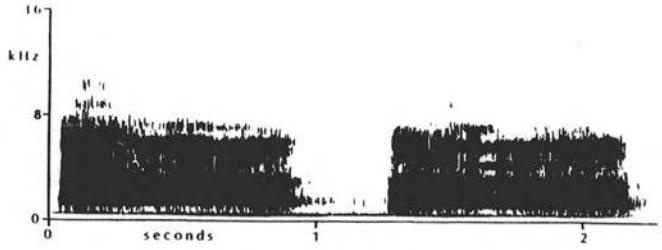

Figure 4. Great Crested Flycatcher, *Myiarchus crinitus*, banded at Manomet Bird Observatory, Manomet, Massachusetts

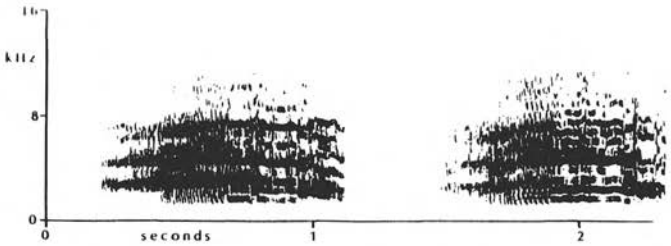

Figure 5. European Starling, *Sturnus vulgaris*, banded in Foxboro, Massachusetts

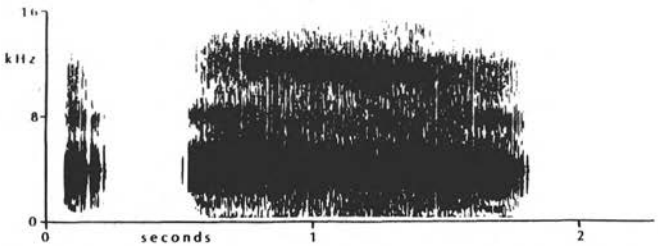

Figure 6. Bare-crowned Antbird, *Gymnocichla nudiceps*, banded in Belize, Central America

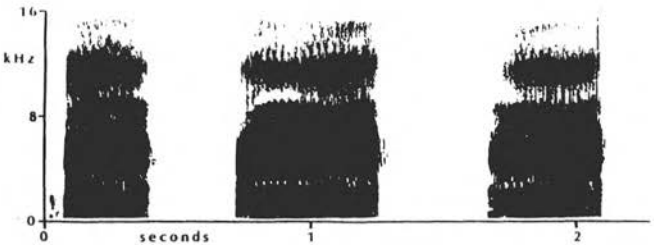

Figure 7. Great Antshrike, *Taraba major*, banded in Belize, Central America

In some species the percentage of individual birds emitting distress calls is high; in other species, low. Are there patterns of high or low responses within families, or patterns of such variation from season to season, between sexes, or by species "temperament"? Most of these questions have been addressed, but the results are often conflicting. Many patterns that emerge are riddled with flagrant exceptions, and some questions simply remain unanswered. Following are some of my own data that relate to these perplexing questions.

I have, for several years, made tallies of birds that emitted distress calls when removed from mist nets or traps and of those that did not. I have received help in this effort from interns at Manomet Bird Observatory; Earthwatch volunteers in Belize, Central America; and "ringers" in Australia. In a preliminary search for patterns of response, both within and among species, I have found more contradictions than consistencies, and many results conflict with published data. I looked at questions relating to how the percentage of birds that emit distress calls varies by season, by sex, within families, and by "temperament." The selected results presented below illustrate particular points with regard to these questions and are taken from a larger data set not yet analyzed statistically. In most cases I chose species with the largest sample sizes. The number of individuals in each sample is represented by *n*.

1. Does the percentage of birds emitting distress calls vary with the season? In some species, such as the Black-capped Chickadee, the percentage was fairly constant, with 7 percent calling in the fall ($n = 468$) and 6 percent in the winter ($n = 52$), or in Ovenbirds with 39 percent in the winter ($n = 38$) and 38 percent in the spring ($n = 8$). Other birds, however, showed enormous variations. Ten percent of Blue Jays called in the spring ($n = 22$), 35 percent in the fall ($n = 31$), and 6 percent in the winter ($n = 31$)! It may be that the high fall figure reflects the number of juvenile birds present. Forty percent of Black-and-white Warblers called in the spring ($n = 15$), however, and none called in the fall ($n = 6$), and no Northern Waterthrushes called in the fall ($n = 15$), but 15 percent called in the winter ($n = 26$).

2. Does the percentage of callers vary by sex? The reports in the literature on this question are conflicting. Balph (1977) reported a notable difference between sexes in Evening Grosbeaks, with females calling more frequently than males. This supported an observation by John Ogden (Norris and Stamm 1965) that in one instance five females gave distress calls and five males gave none. Balph suggested that the difference was related to the plumage dimorphism in this species. In a study of ten English species (Inglis et al. 1982), however, the only one to show significant sex differences was the European Starling, which is not obviously dimorphic! I once captured twenty-four Evening Grosbeaks at one time in my potter traps, with eleven males and thirteen females *all* emitting distress calls. In Belize 62 percent of male

Kentucky Warblers (n = 12) and only 21 percent of females (n = 14) gave distress calls.

3. Is there variation among species in the same family? My data suggest that there is great variability. In the Paridae family, Black-capped Chickadees called 7 percent of the time (n = 520), and Tufted Titmice called 93 percent (n = 55). In the Fringillidae, Evening Grosbeaks called 100 percent (n = 24), American Goldfinches 40 percent (n = 10), House Finches 6 percent (n = 16), and Dark-eyed Juncos 2 percent (n = 80). In the Vireonidae, White-eyed Vireos called 93 percent of the time (n = 21) and Red-eyed Vireos 29 percent (n = 21). In the Trochilidae, Long-tailed Hermits called 86 percent (n = 84), Rufous-tailed Hummingbirds called 35 percent (n = 17), and White-necked Jacobins 18 percent (n = 17). In the Pipridae, Thrushlike Manakins called 88 percent of the time (n = 8), and White-collared Manakins only 14 percent (n = 43).

4. Does the percentage of callers vary by species "temperament"? Some species are characteristically docile, and others are aggressive; some bite when handled, and others do not. Is there any correlation between distress-call response and temperament characters? Norris and Stamm (1965) suggested a correlation between "recalcitrant" birds showing "fright, anxiety, and hostility" and high incidence of distress calls when removed from mist nets (using woodpeckers, titmice, and cardinals as examples). My own data on cardinals and titmice agree with theirs. But what about the Black-capped Chickadee, certainly as feisty a critter as you ever have to remove from a mist net, which called only 7 percent of the time (n = 520) or the Blue Jay, a great struggler, with only 18 percent (n = 84)? Conversely, the tiny, docile Sulphur-rumped Flycatcher called 80 percent (n = 16) of the time, and the passive Long-tailed Hermit 86 percent (n = 84).

To add another variable, the handler apparently affects the percentage of distress calls emitted by a species. Perrone and Paulson (1979) found significant differences in the percentages of birds emitting distress calls for several species when removed from mist nets by different workers. Presumably, birds handled roughly are more apt to scream. Both Balph (1977) and Norris and Stamm (1965) related instances when an individual bird gave a distress call the first time it was captured but not when it was captured a second time.

Both the handling differences and the lack of distress-call emission on second captures suggest that a distress-call threshold of response exists in birds. I tested this idea this past winter (1988). Using a tip from Trevor Lloyd-Evans that European Starlings could be enticed into giving distress calls by holding them upside down by the feet and gently shaking them. I caught seven starlings this winter, none of which gave distress calls when I removed them from potter traps, bagged them, and removed them for banding. But all seven emitted

raucous distress calls when Trevor's procedure was followed. The high incidence of distress-call emission by juvenile House Sparrows contrasted with the low incidence among adults suggests that there may be an age difference in the response threshold. The threshold is low in juveniles, when they are at greatest risk, and becomes higher in adult birds.

Certainly, attempting to sort out all the variables that affect why distress calls are emitted will require much more data and sophisticated statistical analysis. In the end, distress calls may still remain an avian enigma.

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Ted wishes to thank John C. Kricher, Janet Lee Heywood, Wayne R. Petersen, and Martha Vaughan for reviewing an earlier draft of the manuscript; Jean D. Allaway for proofreading; and Andrea Priori at the Cornell University Laboratory of Ornithology, and Leonard Zaichkowsky and Frederick Wasserman of Boston University for assistance in preparing the sonagrams.