COMMENTARY

Condor, 82:234

SOUND SPECTROGRAPHIC ANALYSIS

All animal sounds have not evolved as social signals, and all components of acoustic signals are not necessarily involved in signal function (some may be functionally redundant, sensorily unimportant or undetectable). Such sounds and sound components are nevertheless of interest in numerous disciplines, including functional anatomy, the study of motivation, respiratory and nervous physiology, taxonomy, and evolution (Miller, Behav. Neural Biol. 27:25–38, 1979). Therefore, original descriptions of animal sounds should not be biassed toward features of possible or presumed social function, adaptive design, or sensory or perceptual importance. Such biasses are legitimate only in special-purpose studies in which there is already detailed knowledge of characteristics of interest, and in which a rationale for the biasses is obvious or given. For these reasons, it is desirable to describe new sounds in as much detail as possible, and to avoid specialized systems of notation from which much information is omitted (e.g. Thorpe and Lade, Ibis 103:231–259, 1961).

Hall-Craggs (81:185–192, 1979) recommends some ways of describing sound spectrograms of bird songs so that they are "more accessible to the auditory imagery of readers and . . . comprehensible in musical terms" (p. 186). She considers that these are important for the detailed study of bird song. Many of her suggestions have heuristic value, but they are clearly biassed. Musical qualities of sounds are defined by our perception; they are not properties of sounds any more than pitch or loudness are. The physical properties which lead to these perceptions form only a small fraction of the total characteristics of animal sounds, and there is no reason to expect that they are more significant than other characteristics in some sense. Furthermore, such properties vary in importance, number, and identity across species and across sound classes within species, so cannot all be notated as a matter of routine. For example, it would be possible to apply many of Hall-Craggs's suggestions to the advertising song of male thrushes, only some of them to the "warning" call emitted by thrushes disturbed near the nest, and few or none to distress screams or nestling begging calls of the same species. Similarly, they could not be usefully applied to most sounds of mammals, arthropods, anurans, etc. In addition, alternative methods of description are preferable to some of Hall-Craggs's. Thus amplitude profiles and oscillograms contain more information than does her symbolism for increasing or decreasing "loudness" over sounds; these are technically easy to obtain, and do not rely upon a worker's judgement of shading on sound spectrograms. Finally, a musical (or other) notation of bird song implies a particular kind of structure or order. We must be careful not to assume that such order exists, just because of the system of notation used (Dobson and Lemon, J. Acoust. Soc. Am. 61:888–890, 1977).

New methods of describing behavioral structure are important to the development of ethology. The value of some lies in their particular applications or in the insights they yield. Hall-Craggs's suggestions fall here. The value of others will come from their objectivity, repeatability, ability to deal with detail, and widespread applicability. Conventional oscillograms, power spectra, amplitude sections and sound spectrograms offer these advantages, though only the latter are used in most studies. They should be parts of routine descriptions of animal sounds whenever possible, except in studies of explicitly narrower scope.—EDWARD H. MILLER, *Vertebrate Zoology Division, British Columbia Provincial Museum, 675 Belleville St., Victoria, B.C. V8V 1X4, Canada.*

The point raised by Dr. Miller is relevant not only to descriptions of behavior, but to all biological description. Two issues must be emphasized here. First, no description can be complete. Description must always be selective, some aspects of the original being neglected and others emphasized. Selection implies, of course, either a theoretical background or problems to be solved. These should be explicit, but often they are implicit or unconscious: the beauty of the descriptions by the nineteenth century anatomists lies in part in the elegance with which they selected that which was to be described. The second point is that description is seldom best made in terms of the finest possible divisions of the subject matter. The anatomist's description is not made in terms of electrons and protons, in terms of atoms or, indeed, of cells, but rather in terms of structures such as bones, muscles and nerves. These structures have properties that are emergent from the complex of, for example, cells of which they are constituted (Hinde, Animal behavior, McGraw-Hill, N.Y., 1970).

It was this orientation that was assumed in my paper. A musical description is not, of course, complete. Nor is it useful for all avian vocalizations. But it does serve to emphasize certain properties of some vocalizations which would be neglected by other forms of analysis. It may reveal a particular type of order which is to be found in some but not all vocalizations. This is an aspect of bird song—in particular—which behavioral ecologists are beginning to believe may have an importance in its own right (Dawkins and Krebs [Eds.], Behavioural ecology, Oxford-Blackwell, Oxford, 1978). But the use of this particular descriptive technique does not in any way call in question the value of other techniques in other cases or for other purposes.

I am very grateful for discussion in this matter with Professor Robert A. Hinde.—JOAN HALL-CRAGGS, *Sub-Department of Animal Behaviour, University of Cambridge, Madingley, Cambridge CB3 8AA, U.K.*

Condor, 82:235

CALLS OF THE GREAT POTOO

I read with interest Paul Slud's article (81:320–321, 1979) concerning the calls of the Great Potoo. During 1979 I spent eight months at La Selva and had occasion to hear several hundred calls of this bird. It makes only two types of calls with any regularity (sometimes a call will sound like a mixture of the two). These were described by Slud as a "baaaao" and a "whoap." I agree with his remarks about the latter and have a little information to add on the former.

To my ear (and to others) the "baaaao" corresponds to a long drawn-out "oorrr" pronounced by drawing air into the lungs at a low note. This of course is not precise, but the sound, or variations of it, can come close to mimicking the bird's call. I have found that it is only made while the bird is perched.

Slud's statement that the bird *apparently* makes the "whoap" call both in flight and at rest is, in fact, true.—DONALD R. PERRY, *247 'C'Bicknell, Santa Monica, California 90405.*

Perry has confused the well-documented "baaaao" with the completely different "oorrr," leading to the following anomaly. The final paragraph of my note cites the very froglike cry to which the "baaaao" has been likened as being uttered in flight from tree to tree. Thus, Perry's belief that his "oorrr" is the same as my, and everybody else's, "baaaao" controverts his statement "that it is only made while the bird is perched." Surely the "baaaao" and the "oorrr" coexist in the repertory of the species, to be used as the birds see fit in time or space and according to circumstance.—PAUL SLUD, *National Museum of Natural History, Washington, D.C. 20560.*

Condor, 82:235

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