MOBBING BEHAVIOR BY CROWS: THE EFFECT OF THE "CROW-IN-DISTRESS" MODEL

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Lorenz (King Solomon's Ring, p. 141, Crowell, New York, 1952) reported that tame Jackdaws (*Corvus monedula*) attacked his hand when he carried a pair of black swimming trunks; he went on to suggest that "dangling black" releases an innate predator-attacking mechanism in these birds. The phenomenon of mobbing closely approximates this behavior, although studies by Hartley (Symp. Soc. Exp. Biol. 4:313–336, 1950) and Nice and Ter Pelwijk (Auk 58:195–214, 1941) were unable to identify a simple stimulus configuration that consistently released mobbing of owl models. I pursued this question by observing the mobbing response of free-living Common Crows (*Corvus brachyrhynchos*) in experiments on the campus of the University of Washington, Seattle.

I presented three different models to the breeding population of crows during the period 1 March–1 May 1974. The models consisted of a 38-cm plastic replica of a perched Great Horned Owl (*Bubo virginianus*), either (1) alone, (2) with a 28-cm black plastic replica of a crow lying on its side in front of the owl, or (3) with a 28-cm piece of black velvet cloth lying in front of the owl. The models were always presented atop a 1.5-m wooden perch, and all tests were conducted from 11:00 to 11:20. The tests occurred on alternate days, with each model set-up used once each week and the association of models to days determined randomly each week.

Mobbing in free-living animals is a complex behavior that involves many individuals in a temporally varying pattern of physical approaches and vocalizations. Hartley (op. cit.) and Hammerstrom (Condor 59:192–194, 1957) reported the number of "mobbing" animals under various experimental conditions. However, without explicit criteria of approach distance or intensity of calls, such data are of limited value. In my study, I evaluated mobbing intensity in two ways: (1) a tripod-mounted camera with a telephoto lens was placed 30 m from the model. Standardized photographs were taken at 1-min intervals so that counts of the number of crows visible in successive pictures provided a quantitative record of the mobbing response over time. (2) I measured the loudness of mobbing calls with a decibel meter and a microphone installed on the perch, concealed near the base of the model. A measure of noise level was obtained by point-censusing the decibel level at 15-sec intervals. The results of these measurements are given in table 1.

TABLE 1. Comparison of mobbing responses by Common Crows, as elicited by three models.

Model	Mean no. of mobbers[a]	Mean decibel level[b]
Owl	6.2 (SD 2.7)	18 (SD 11.1)
Owl-crow	14.7 (SD 4.9)	41 (SD 22.3)
Owl-cloth	12.9 (SD 4.9)	36 (SD 21.8)

[a] Based upon at least 160 photographs in each case.
[b] Based upon at least 600 point-censuses in each case.

Both the owl-crow model and owl-cloth model elicited significantly more mobbing crows than did the owl alone (t-test, $P < 0.01$). The differences between the owl-crow and the owl-cloth models, however, were not significant. Likewise, both the owl-crow model and the owl-cloth model elicited significantly higher mean decibel levels than did the owl alone (t-test, $P < 0.01$). Again, the difference between the owl-crow and the owl-cloth models was not significant. Considering the means for each day's results separately, the owl model produced a slight, nonsignificant trend of habituation during the course of the experiment—a reduction in both number of mobbers ($r = -0.24$) and decibel level ($r = -0.18$). Both the owl-crow and the owl-cloth models elicited nonsignificant positive correlations of both numbers of mobbers ($r = 0.21$ and 0.18) and decibel level ($r = 0.35$ and 0.26) from 1 March until 1 May. Throughout this study, habituation may have been confounded with effects due to seasonal progression of the nesting cycle.

This brief study presents the first potentially replicable quantitative data of mobbing behavior in free-living birds. It supports Lorenz's contention that the presence of a black object stimulates corvid aggressiveness toward potential predators although it does not examine the supposed innateness of that behavior. The significantly heightened intensity of mobbing elicited by both the owl-crow and owl-cloth models in comparison with the owl model alone, combined with the similarity of response to the owl-crow and owl-cloth models, suggest that a simple "releasing mechanism," whether innate or learned, is involved.

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REACTIONS OF QUAIL TO FLYING VULTURES

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I have been investigating the recognition of aerial predators by birds. The fortuitous appearance of a flock of 12 Bobwhite (*Colinus virginianus*) at my home offered an opportunity to observe closely their reactions to overflights by birds. I watched the quail for about 15–20 min on 6 and 8 December 1973, noting no apparent reaction to Red-bellied Woodpeckers (*Centurus carolinus*), Cardinals (*Cardinalis cardinalis*), and smaller birds which flew about 2–5 m over the quail while passing from trees to an elevated feeder.

On 8 December, a Turkey Vulture (*Cathartes aura*) passed almost overhead at an elevation of about 50 m, and I noted no overt reaction by the quail. On 9 December, I watched the quail for about 50 min while they fed, apparently on crushed acorns on my driveway, during which time they remained within 15 m of my home. At 11:10, an immature Turkey Vulture passed directly overhead at an elevation of about 30 m. The quail appeared to "freeze"