A Comparison of Nest Defence by Jackdaws, Rooks, Magpies and Crows

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Received October 11, 1979 / Accepted May 7, 1982

Summary. Nest defence behaviour of four corvid species towards a common foe, the carrion crow, was examined. The various species responded quite differently when a caged crow was presented near the nest. Compared with the other species magpies attacked the caged crow most often. Rooks were very vociferous and circled much above the crow. Jackdaws usually perched nearby; occasionally, they circled over and scolded at the crow. Crows flew off and frequently started to forage at a distance, behaving as though nothing alarming was happening near their nest. These differences in nest defence behaviour have been related to inter- as well as intraspecific variations in nesting conditions, including accessibility, camouflage, site, dispersion and construction of nests. Behavioural responses and nesting conditions are finely tuned and can be considered as elements of adaptive complexes promoting the safety of the nest.

Introduction
Carrion crows (Corvus corone), rooks (C. frugilegus), jackdaws (C. monedula) and magpies (Pica pica) are closely related, sympatric species considerably overlapping in habitat and diet, yet differing markedly in nest requirements, nest dispersion and nest construction (e.g. Lockie 1955, 1956; Holyoak 1967, 1968; Goodwin 1976; Bossema et al. 1976, and unpublished data).

The aim of the study reported in this paper was to describe the nest defence behaviour of these four species and to relate differences in behaviour to their interspecific relations and nesting conditions. Nest defence behaviour was elicited by presenting a caged carrion crow near the nests of breeding pairs of all four species. A crow was used because crows dominate the other species and are a common threat to nests of all four species (e.g. Bossema et al. 1976).

The nesting conditions are as follows. Carrion crows are solitary nesters and build open nests, usually in or just below the canopy layer of tall trees. Their nests are better camouflaged than those of the other species. Rooks breed in compact and conspicuous colonies, most often in more or less isolated groups of very tall deciduous trees with open nests in the topmost branches. Jackdaws are hole-nesters, using a large variety of holes that they do not excavate themselves. Common nest sites are woodpecker holes, hollow trees, holes in cliffs, rabbit holes, nestboxes, chimneys, church-towers and ruined buildings. Depending on the dispersion of suitable holes, jackdaws may breed more or less solitarily or in loose colonies. Magpies nest solitarily. They usually build large, conspicuous, domed nests in the top of trees.

Materials and Methods
The observations were carried out during the breeding season, from March to the end of June 1978, in the vicinity of Groningen in the north of the Netherlands. The area is flat and consists mainly of cultivated grassland, dotted with villages, farmhouses and small patches or belts of trees. All four species are abundant in this area.

The results of this study are mainly based on a series of observations each consisting of three consecutive 20 min periods: a pre-test period, during which an empty, cylindrical wire cage (40 x 40 cm) was hoisted up to within 2 m of an inhabited nest; a test period, when a crow was in the cage; and a post-test period, after cage and crow had been taken away. During these periods we carried out observations from a distance of approximately 70 m hidden in a car or behind bushes. Generally, hoisting up or pulling down the cage scared breeding birds off the nest; if not, they were chased off by hand clapping, so that at the start of all observations the breeding birds were off the nest.
Throughout the breeding season we searched for inhabited nests of the four species to carry out tests. Whenever such a nest was found, a rope was attached to the branch near the nest for the purpose of hoisting up the cage. Tests were carried out at least 2 days after attachment of the rope. During this period or immediately after the first test 13 out of 23 crow nests were deserted but none of the three other species.

In total 29 different jackdaw nests, 12 rook nests, 24 magpie nests and 18 crow nests were tested. Some nests were tested only once, others at weekly intervals throughout the breeding season. This enabled us to investigate whether the stage of the nesting cycle influenced the intensity of the responses by "naive" birds (i.e. birds not tested before) and whether repeated testing produced any waning of the responses due to habituation. Where necessary the possible influence of these two factors on comparing results has been eliminated by matching the data in these two respects.

The following types of response by adult birds were recorded: (1) Attacking: the attacking birds pounced on the cage or clung to it, pecking at the crow through the wire; (2) Scolding: a loud grating 'karr' by jackdaws, rooks and crows and a rattling 'shak-shak-shak' by magpies; (3) Circling and flying over the nest; (4) Returning onto the nest.

The reactions of adults and nestlings to human intrusions were also recorded.

**Results**

*Responses by Each of the Four Species*

**Magpies.** Only attacking and scolding by magpies was significantly more often observed during test periods than during pre-test periods: Sign test, \( P = 0.001 \) and \( P = 0.00003 \) respectively.

Magpie nests comprise two categories on the basis of nest structure: roofed and unroofed ones. Tests \((n = 41)\) at unroofed nests \((n = 11)\) were more likely to elicit attacks by magpies on the caged crow than were tests \((n = 30)\) at roofed nests \((n = 13)\); \( \chi^2 = 8.21, P < 0.01 \).

Of the magpie nests encountered in this study, 19 had a roof and 89% of these nests were situated near human dwellings (i.e. within approximately 25 m). In contrast, most unroofed nests (82%) were encountered away from human dwellings. Baeyens (1981) showed that only 27% of roofed nests were visited by crows and none disturbed. For unroofed nests the figures were 100%, both for crow visiting and disturbance. So, our finding that magpies owning unroofed nests have a higher tendency to attack a caged crow may indicate that magpies adjust the strength of their nest defence to the strength of crow pressure. However, a complicating factor is that both Baeyens and ourselves found evidence that magpies breeding away from human habitation are likely to be younger, and it is unknown how age affects the tendency to defend the nest against crows.

**Rooks.** Members of this species were more likely to scold, circle and return to their nest during test periods than during pre-test periods: Sign test, \( P = 0.001, P = 0.0025 \) and \( P = 0.002 \) respectively. Attacking occurred rarely.

Occasionally rooks nest singly, i.e. over 80 m from the nearest neighbouring nest of a colony. Three such nests have been tested and the reactions compared with those obtained at nine colonial nests.

Tests \((n = 31)\) at colonial nests were more likely to elicit scolding than tests \((n = 10)\) at solitary nests (Fisher test, \( P < 0.05 \)). Circling was as likely to occur during tests at solitary as at colonial nests, but the mean number of circling rooks was much larger in the colony than at the solitary nests \((\bar{x} = 66.4 \text{ and } \bar{x} = 12.6 \text{ respectively}; t = 2.61, df = 41, P < 0.02)\). In 27 out of 31 tests at colonial nests a rook returned to the 'threatened' nest (i.e. nest within 2 m of the caged crow), whereas this happened in only 5 out of 10 tests at solitary nests (Fisher test, \( P = 0.025 \)). As with magpies we see that nest defence depends on nesting conditions.

**Jackdaws.** These birds were more likely to scold and circle during test periods than during pre-test periods (Sign test, \( P = 0.00003 \) and \( P = 0.0071 \) respectively). Attacking never occurred.

Jackdaw nests over 50 m away from the nearest neighbouring nests we considered as solitary and ones up to 5 m apart as colonial nests. Tests \((n = 17)\) at solitary jackdaw nests \((n = 3)\) were as likely to elicit scolding, circling and returning to the nest by the jackdaws as were tests \((n = 26)\) in four different colonies comprising on average ten nests. Not even did the mean number of circlings and soldings per test in colonies exceed significantly the number elicited at solitary nests.

Occasionally, jackdaws build open tree nests in the dense and dark canopy of coniferous trees, sometimes singly but most often in colonies. Such nests are seldom successful: in a sample of 32 open nests, only 15.6% fledged at least one young, whereas of 121 hole nests 67.8% did. Tests at open and hole nests – matched as to nest dispersion – did not produce any significant differences in responses to the caged crow, but only five open nests were tested.

**Crows.** Crows were more likely to circle and scold in test periods than in pre-test periods (Sign test, \( P = 0.0274 \) and \( P = 0.001 \) respectively). Except for one pair that attacked the caged crow, all crow pairs \((n = 18)\), after being chased off the nest by the hoisting up of the empty cage or the caged