

Ontogeny of Roosttime Restlessness in the American Robin (*Turdus migratorius*)

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When American Robins (*Turdus migratorius*) are maintained in captivity under conditions of natural illumination, they typically display a moderate amount of activity in the early daylight hours, then a gradual decline in activity as the day progresses, and finally a brief period of high activity at dusk just before settling down for the night (Eiserer 1979). The high activity at dusk may be a behavioral correlate of the robin's roosting habit—its practice of flying to a communal roostsite each evening and sleeping there with conspecifics. As such, this "roosttime restlessness" seems in many ways a daily analog to the "migratory restlessness" that captive robins and other songbirds display at certain times of the year (Eiserer 1979).

The present work investigated the ontogenetic development of roosttime restlessness in the American Robin. If the restlessness at dusk is truly a reflection of the robin's tendency to travel to a communal roostsite, then it should first appear at the age when a young wild robin would be expected to make its first visit to the roost—namely, a few days after fledging occurs. In surveys of the breeding habits of robins, Howe (1898) gave a range of 11–16 days, with a usual period of 14, for the age at which nestlings leave their nests; Howell (1942) cited infrequent extremes of 9 and 16 days but suggested an average of 13; and Young (1955) found a mean of 13.4 days for 56 nestlings. Several observers have also noted that young robins only begin to acquire significant flying ability a couple of days after leaving the nest (Howell 1942, Young 1955). Because it is probably at this time that the young birds would begin following adults to the roostsite (Eiserer 1976), one might predict that roosttime restlessness would first emerge in hand-reared birds at around day 15 or 16 posthatch. To test this prediction, I monitored the activities of nestlings each day until restlessness at dusk first appeared.

Two robins, nestmates among a clutch of four, were removed from their nest in the Lancaster, Pennsylvania area on the sixth day posthatch. Food was offered to each bird approximately once every 40 min from dawn to dusk; feeding was scheduled so as never to occur within 5 min of any observation period. The birds' diet consisted of a mixture containing egg yolk, applesauce, codliver oil, dog food, strained carrot, commercial mynah bird food, and cottage cheese.

During the first 6 days of observation (days 7–12 posthatch), each nestling was individually kept in a bowl lined with replaceable facial tissues. A cardboard divider separated the two nestbowls so that the birds could not see one another, but because both nests rested on the same table, the robins could hear one another. An observer, sitting quietly some 1.5 m away from the nestbowls, monitored the nestlings through a one-way mirror that was angled so that the birds could not see their reflections.

At approximately 0600 on the seventh day of observation (day 13 posthatch), both nestlings jumped out of the nestbowls, some 25 min apart. The birds were then moved to individual cages (35 × 50 × 38 cm) that were equipped with two parallel perches 20 cm apart. Again the robins were visually but not auditorily isolated from one another. Throughout the experiment the birds were maintained under natural illumination.

Observations were made from 6–15 June 1978 (days 7–16 posthatch). Each nestling was monitored for a period of 5 consecutive min every 20 min from dawn to dusk. Although the nestlings were formally monitored only every 20 min, they were kept under continuous observation during the last 2 h of each day in order to check the possibility that brief displays of restlessness might by chance fall between the monitoring periods. The birds' behavior was quantified in terms of *inactivity*, defined as the number of seconds that a given nestling spent sitting or lying quietly in its nestbowl, or—after the birds had been moved into cages—standing quietly either on a perch or the cage floor. Given the rapidly changing behavioral repertoire that characterizes songbird nestlings, inactivity is perhaps the only measure that can readily be utilized with young and older nestlings alike.

Both nestlings were extremely inactive on days 7–8, and no noticeable change in activity level occurred as a function of time of day (Fig. 1). On days 9–10, both birds showed more activity than on the previous 2 days but still failed to show any pattern of change across the daylight hours. On days 11–12, overall activity increased still further, but the birds still did not show any clear pattern of change that could readily be construed as roosttime restlessness. On days 13–14, however, high activity at dusk appeared in both birds for the first time (the days 13–14 graphs for both birds in Fig. 1 accurately reflect the activity patterns for both day 13 and day 14, individually, so that both birds actually became restless for

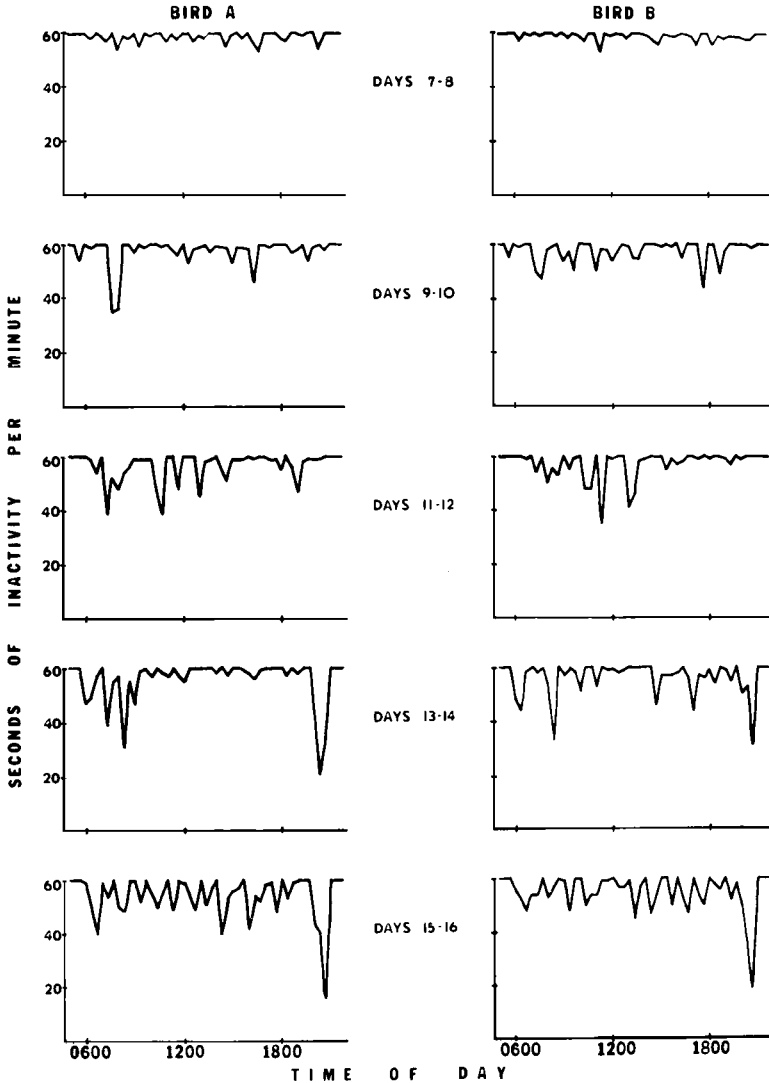


Fig. 1. Seconds of inactivity per minute for each of the observation periods, averaged across pairs of days. Data for Nestling A are on the left, and for Nestling B on the right.

the first time on day 13). Although the activity at dusk appeared to be less marked for bird B, a clear qualitative difference in fact separated the activity at dusk from the quantitatively equivalent activity that had occurred earlier in the day (i.e. 0820). The latter was primarily preening behavior, while no preening at all occurred during the former; instead, bird B's activity at dusk consisted of intermittent running movements on the bottom of its cage. In any event, bird B clearly became restless at dusk on days 15-16, as did bird A.

The appearance of roosttime restlessness in the nestlings on day 13 posthatch was a few days before the 15- or 16-day age that was initially predicted. This is somewhat puzzling, as behavioral restlessness in as yet flightless fledglings would seem likely to produce no significant effect except to make those birds conspicuous to potential predators; such conspicuousness should constitute a strong selective pressure against the premature (i.e. prefunctional) appearance of restlessness in fledglings. Assuming that the prediction itself was correctly reasoned, one possible explanation for the existing discrepancy may lie in

the artificial but enriched diet afforded these nestlings, a diet that may have accelerated development (relative to naturally occurring rates of development) of whatever brain structures underlie the restlessness phenomenon. Considerable experimental evidence indicates that malnutrition in very young organisms can retard brain development (Manocha 1972: 60–91, Winick 1975), and it is possible that free-living nestlings seldom receive truly optimal diets for neuronal development.

This explanation, however, remains highly speculative. The two nestlings I observed may not be entirely representative of the general robin population. It was unfortunate that the day on which dusk activity first emerged was the same day that the birds had to be moved into cages, as it is conceivable that the restlessness occurred somewhat prematurely because of the move. Given that the move was made a full 14 h before dusk, however, and given that the birds themselves forced the move by their own abandonment of the nestbowls, the confounding probably was not crucial to the present results.

In any event, the present results were very close to those predicted. It was possible, after all, that the high activity at dusk would actually be evident as soon as the birds were physically capable of showing significant locomotor behavior (around day 10); alternatively, the restlessness might not have appeared before autumn or even until the birds were fully mature. Thus, the finding of restlessness on day 13 can be considered as further support for the premise that the high activity of captive robins at dusk is in fact a behavioral correlate of the roosting tendency in this species.

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Prey of the Harris' Hawk in Central Chile

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Although the Harris' Hawk (*Parabuteo unicinctus*) is widely distributed in Chile (Blake 1977), little is known about its food habits. Johnson (1965) reported that it "preys indiscriminately on rabbits, rats, small birds, reptiles, and frogs, but is also quite ready to raid chicken-roosts or dovecoats when the opportunity arises." Greer and Bullock (1966) analyzed stomachs of two freshly killed individuals in Malleco and found "a lizard (*Liolaemus* sp.), a rat (*Rattus* sp.), and parts of a rabbit (*Oryctolagus cuniculus*)." Because the presently available information is either anecdotal or scarce, we wished to quantify the incidence of different prey items in the diet of the Chilean Harris' Hawk on a sounder data base.

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