

Rhythmic Feeding Patterns Among House Sparrows

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Most species of birds adopt diurnal or nocturnal rhythmic patterns of behavior that are synchronized with the 24-hour solar day. Feeding rhythms have been studied in species of birds ranging from American Wigeons (Mareca americana) (Leck 1971) to House Sparrows (Passer domesticus) (Summers-Smith 1963). In a 4-year study of House Sparrow breeding activities at Mississippi State University, Oktibbeha County, Mississippi, from 1972 through 1975, I observed temporal rhythmic feeding patterns of House Sparrows under natural conditions in 4 different nesting areas.

During the winter months of 1972 and 1973 I studied the extent of feeding activity in adult House Sparrows. A more detailed study of the feeding of nestlings was made from 1972 through 1975. A total of 254 nests was studied. My observations included 145 days on which continuous observations were made from 05:00 to 19:00 and 32 days on which I observed nests for shorter intervals. Because of the placement of nests I was able to observe from 1 to 7 nests at one time.

The number of visits to the nest with food was used as a measure of feeding activity. Royama (1966) stated that feeding frequencies are far too variable to be used as a true index of food consumption per nestling, but according to Pettingill (1970), no matter how food is supplied, the individual nestlings receive approximately equal amounts during the course of a day due to automatic apportionment. Records were kept of the number of food visits for each hour of the day for each nest.

Statistical analyses were performed on the UNIVAC 1106 computer at Mississippi State University. Basic statistics were obtained from these data by the first option of UNIVAR (1973 version), a basic statistics program written by D.M. Power. The second option of UNIVAR was used to rank the means in descending order by Gabriel's sum of squares simultaneous test procedures (SS-STP). I used a probability level of 0.05 as the criterion for significance in all statistical analyses.

The hourly rate of nestling feeding followed a similar pattern for each year and for each of the colonies. Three peak feeding periods occurred daily, late morning, mid afternoon, and late afternoon (Fig. 1). Feeding was minimal between 05:00 and 06:00 and between 18:00 and 19:00. Although the diurnal variation in feeding followed a rhythmic pattern, analysis showed significant differences among the hours of activity. Where these differences occurred is revealed by the SS-STP analysis

(Table 1). I found a mean feeding rate of 16.5 times per hour with a mean of 3.55 young per nest (Sappington 1977). Kendeigh (1952) reported a mean rate of 20 times per hour for nestling House Sparrows with 4 in the nest. Comparison of our data sets indicates that they do not differ significantly ($\chi^2 = 0.334$).

TABLE 1. Comparison of mean total number of hourly visits to nests made by House Sparrows feeding nestlings.

Time (CST)*	Number of Cases	Mean	SS-STP
1400-1500	293	27.1	
1000-1100	297	27.0	
1700-1800	298	24.4	
0600-0700	295	19.9	
0900-1000	298	19.7	
1100-1200	296	18.7	
0700-0800	296	18.6	
1300-1400	299	17.8	
1500-1600	295	17.6	
1600-1700	297	17.5	
1200-1300	294	17.4	
0800-0900	294	16.9	
0500-0600	300	6.3	
1800-1900	205	6.3	

Hour intervals are arranged in descending order of magnitude of the mean frequency at which nestlings were fed. Lines in the column labelled SS-STP connect hour intervals for which the feeding rates are not significantly different.

My study of adult House Sparrow foraging activity during the winter showed also that the feeding rate was synchronized with 3 peaks occurring, one in the early morning lasting until about 08:00, another near the middle of the day from 12:00 to 14:00, and the third beginning about 16:00 and continuing until just before going to roost. I postulate that the reduction of feeding nestlings by parents during the early morning and late afternoon was because they were feeding themselves during those times.

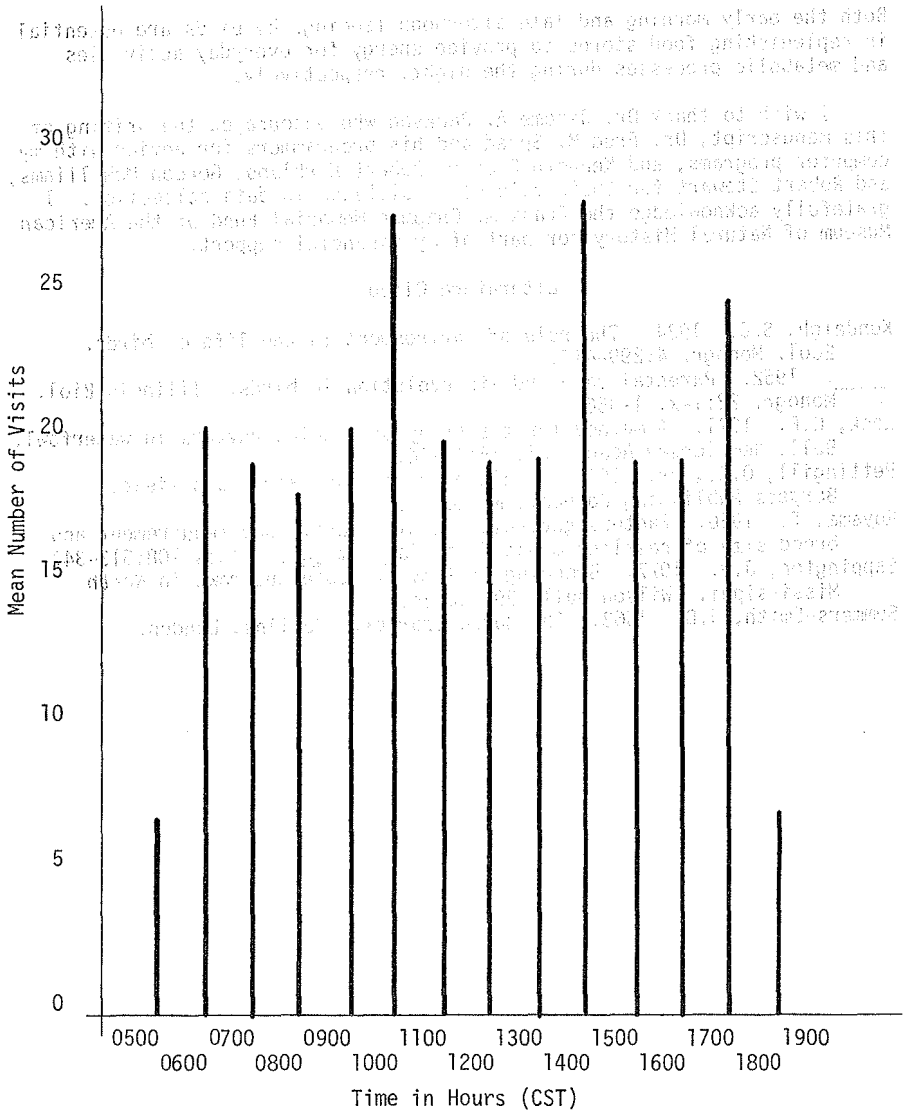


Figure 1. House Sparrow Nestling Feedings per hour (Sample sizes as in Table 1).

Both the early morning and late afternoon feedings by birds are essential in replenishing food stores to provide energy for everyday activities and metabolic processes during the night, respectively.

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