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The Stimulus Value of the Decoy Trap

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Birds learn to avoid some types of traps because of the immediate negative reinforcement every time they enter. With a drop-door trap, for instance, the reinforcement involves the dropping of the door and the unsuccessful efforts to escape. With a decoy trap (Burtt & Giltz 1971), on the other hand, the immediate reinforcement is positive in the form of food, water, and association with other birds, some of them con-specific. Only considerably later does the negative aspect occur when the bird discovers that it is confined. It is well established that delayed reinforcement is much less effective than immediate reinforcement in habit formation (cf. Burtt 1967, p. 120). Hence, birds do not learn to avoid a decoy trap. In fact, some birds re-enter the trap (repeat) many times. A grackle repeated 70 times in one summer.

Another factor that brings birds into the decoy trap initially, and often repeatedly, is the trap's stimulus value or appeal. This includes piles of food, large pans of water, green grass, a small shaded area, ample space to move about, and numerous birds flying around, perched, or bathing. It is possible that this stimulus value may be enhanced by further experience in the trap. This possible enhancement is the subject of the experiment reported here.

The experiment was designed such that the experimental birds spent many more hours in the trap than did the control birds. The two groups were then compared in terms of subsequent numbers of repeats. The hypothesis to be proved or disproved is that additional experience in the trap increases its stimulus value and leads to more re-entries.

The experiment involved 284 Mourning Doves *(Zenaidura macroura)* in the summers of 1973 and 1974. The trap was operated almost every afternoon. Each experimental bird was captured in the gathering cage and replaced in the trap 3 times before final release. Each control bird was captured and released immediately. For example, an experimental bird was captured Monday afternoon, banded, and replaced in the trap. Tuesday, it was captured and replaced again, and likewise on Wednesday. Then, on Thursday, it was captured and released. Thus, the bird spent at least 72 hours in the trap in addition to the time between first entry and first capture in the gathering cage. Occasionally, a bird spent more than 72 hours if it avoided being driven into the gathering cage. The control birds spent only the time between initial entry and capture. In subsequent repeats some time, of course, was spent in the trap but this should average about the same for both groups.

Experimental and control birds were matched as to time of initial banding. Approximately the same numbers of each group were started each week. Both groups likewise had the same opportunity to repeat. The trap was operated well into December in both years, although very few Mourning Doves were captured after the end of October.

The data for each group are tabulated as to the frequency of repeats — 0, 1, 2, etc. — in Table 1. Obviously, the distributions are skewed toward fewer repeats, with the control group much more so than the experimental group. It seems unnecessary to plot the actual distribution curves. For the control group, 74% of the birds (121) have no repeats as against only 9% of the experimental birds.

With such distributions, a logical approach would be to compare the medians. For the experimental group, the median is 3.41 repeats, but for the control group it is somewhere in the zero class — possibly 0.67 if we make the doubtful assumption that the birds are uniformly distributed between 0 and 0.99 repeats. Further, if we wish to check the significance of the difference between the medians by a 2 x 2 contingency table, determining the number above or below the median in the control group is virtually impossible. Therefore, we resort

Table 1. Frequency of various numbers of repeats

Number of repeats	Group frequency	
	Experimental	Control
0	11	121
1	29	11
2	16	9
3	11	5
4	12	2
5	6	4
6	6	1
7	3	3
8	2	0
9	5	1
10	3	0
11	1	0
12	1	2
13	1	1
14	1	0
15	1	0
over 15	12	3

Table 2. Number of repeats after different lengths of time in decoy trap.

	Sample number	Mean number of repeats	Standard deviation
Experimental group	121	5.35	6.48
Control group	163	1.25	3.33

to the means and standard deviations shown in Table 2. Then we apply a t-test to the difference between means to check the null hypothesis that the 2 samples are drawn from the same population. The result is t of 6.36, where a value of 3.33 is sufficient to reject the hypothesis at the 0.001 level. Clearly the experimental group does more repeating than the control group.

When standard deviations are much larger than the means, as in Table 2, it is common practice to determine if the distribution is binomial, as required by the t-test, or random as in a Poisson distribution where each number of repeats (as in Table 1) has the same probability of occurring. Accordingly, the exactness of fit of a Poisson distribution to the observed frequencies in each group is tested by Chi Square (cf. Zar, 1974, p. 302). The null hypothesis that the observed frequencies are distributed randomly (Poisson) is rejected for both groups. Without computing all the terms, Chi Square is over 400 for each group, whereas only 24.32 is needed to reject the hypothesis at the 0.001 level. This tends to confirm the t-test results.

One further comparison of the two groups can be made by computing Chi Square for the difference between the *distributions* and testing the hypothesis that they are drawn from the same population. Chi Square is 123, whereas 40.79 is sufficient to reject the hypothesis at the 0.001 level.

With the means and the distributions both favoring the experimental birds, our initial hypothesis appears to be confirmed. Additional experience in the decoy trap enhances its stimulus value and leads to more subsequent re-entries. In anthropomorphic terms, the birds have a good time in the decoy trap and try to enjoy more of it.

Literature cited

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