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HOW BIRDS INTERPRET DISTRESS CALLS: IMPLICATIONS FOR APPLIED USES OF DISTRESS CALL PLAYBACKS

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ABSTRACT: Distress call playbacks are used as deterrents to keep birds out of areas where they are causing problems. However, the calls often are ineffective, owing to birds' rapid habitation to them. Recent studies on the functional significance of distress calls indicate that adult passerines only distress call when physically constrained and that the calls are designed to startle the predator holding the caller into releasing it. Further, distress calls attract other birds, which approach the caller to acquire information about the predator. These findings suggest that distress calls would be more effective if their broadcast is paired with a predator model that appears to be grasping the caller. Such a pairing should reinforce a bird's fear of the predator model and delay its habituation to the distress call.

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INTRODUCTION

Distress call playbacks have been used for decades to keep birds out of areas where they are causing problems (Frings and Jumber 1954, Frings et al. 1955). Their ability to repel birds has been evaluated in agricultural fields (Boudreau 1975, Naef-Daenzer 1983, Summers 1985), airports (Blokpoel 1976), fish ponds (Spanier 1980), and roosts (Pearson et al 1967, Brough 1969). Usually, distress call playbacks effectively deter birds for only a few days or weeks before habituation sets in. Hence, distress call playbacks are most effective for short-term problems such as protecting a ripening field that will be harvested in a few days or in dispersing a group of birds that are migrating through an area.

Before distress call playbacks can live up to their potential of alleviating longer-term problems, we need to know why birds habituate rapidly to them and what can be done to delay this process. In this regard, we must understand why birds distress call and how other birds, who hear a distress call, interpret it and what they expect to find when they approach the caller.

FUNCTIONAL SIGNIFICANCE OF DISTRESS CALLS

Distress calls are emitted by adult birds which are physically constrained by a predator (Schmidt and Johnson 1984) and are distinctive from alarm calls (Thompson et al. 1968; Stefanski and Falls 1972a, 1972b; Starkey and Starkey 1973). Two major hypotheses have been proposed to explain why an adult bird facing imminent predation should distress call. The startle-the-predator hypothesis states that a bird distress calls to startle the predator into releasing it (Driver and Humphries 1969), The other hypothesis is that distress calls are designed to attract attention to the caller (attract-attention hypothesis). There actually are four subcategories of this hypothesis that differ in whose attention the caller is trying to attract and what the intended recipient is suppose to do when it arrives. The request-aid hypothesis states that a bird distress calls to solicit the aid of kin or other birds (reciprocal altruists) to help it escape.

The warn-kin hypothesis assumes that distress calls are designed to warn kin about the dangerous predator that has captured the caller and hence to increase the kin's probability of surviving. This hypothesis argues that distress calling does not increase the caller's chances of surviving the predator attack but does enhance the caller's inclusive fitness by increasing the probability of its kin avoiding a similar fate.

The attract-an-audience hypothesis assumes that birds can gain valuable information by witnessing a predator-prey interaction and use that information to avoid predation in the future (Conover 1987). This hypothesis states that sometimes the predator's best interest is to release a victim rather than attract the attention of too many birds. This hypothesis is supported by the finding that birds can acquire information from watching predator-prey interactions (Kruuk 1976, Curio et al. 1978, Conover and Perito 1981, Conover 1984, Shields 1984, Conover 1987).

The attract-another-predator hypothesis argues that distress calls are given to attract a second predator that will threaten or disturb the predator which has seized the caller, allowing the latter an opportunity to escape. This hypothesis is supported by the observations that distress calls sometimes attract predators (Perrone 1980, Hogstedt 1983, Koenig et al. 1991).

Recent experiments support the startle-the-predator hypothesis. Some captive raccoons *(Procyon lotor)* and opossums *(Didelphis marsupialis)* that were attacking a caged starling *(Sturnus vulgaris)* were startled when a distress call was first broadcast, and they released the bird (Conover, in press). Prior to the call's onset, these predators exhibited no such behavior.

Conover (in press) demonstrated that distress calls usually consisted of a brief series of notes less than five seconds in duration and that these were followed by periods of silence before another distress call was initiated. This pattern was consistent with the startle-the-predator hypothesis, but the attract-attention hypothesis predicted long and continuous calls to increase the chances that the intended recipient would be able to hear the caller and locate it.

Conover (in press) also showed that birds are more likely to distress call when they have an opportunity to escape from the predator's grasp, as expected with the startle-the-predator hypothesis. For instance, birds distress call more when held loosely or by their limbs than when held securely by the body or neck. These data

support the startle hypothesis. In contrast if the only function of a distress call were to attract attention, then a bird should distress call more when held securely by the body or head because its chances of escaping on its own are diminished and its need for aid is increased.

IMPLICATIONS FOR THE USE OF DISTRESS CALL PLAYBACKS TO SCARE BIRDS FROM PROBLEM AREAS

Upon hearing a distress call, birds usually approach the caller rather than flee or hide. They do not usually attack the predator or engage in any behavior that would aid the caller, but rather they observe the predator (Conover, in press). Birds engage in this behavior to acquire information about the predator and are able to use this information to reduce their own chances of falling prey in the future (Conover and Perito 1981, Conover 1987, Conover, in press).

Such findings indicate that birds, which approach the sound source when they hear a distress call playback, are expecting to see a bird being physically constrained by a predator. However, wildlife damage managers rarely pair distress call playbacks with predator models or other visual stimuli. This lack of pairing may reduce the effectiveness of distress calls and allow birds to habituate to their playback more rapidly than would otherwise be the case. If distress call playbacks are paired with a predator model, especially one that appear to be grasping the caller, birds that approach the sound source might have their initial fears reinforced rather than alleviated. Support for this hypothesis comes from the findings that starlings and American crows *(Corvus branchyrhynchos)* habituated less to plastic owl models when the models appeared to be grasping a struggling bird in their talon (Conover and Perito 1981, Conover 1984).

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