The Almighty Trembler: the Method Behind the Madness

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Abstract

The purpose of this study is to determine why trembling behavior evolved in *Cinclocerthia ruficauda*. This species belongs to the family Mimidae. This particular species is found almost exclusively on the island of Dominica, where its common name is the Trembler. This bird performs a behavior that looks like it is actually trembling in fear. This behavior generates an energetic cost and begs the question, what benefit does it give the individual that is substantial enough to offset the energetic cost of the activity? The hypothesis is that trembling is an aggressive display. I collected observations in the secondary, transitional rain forest of Dominica. My observations suggest that the hypothesis is indeed correct; trembling is an aggressive display. The nature of the display and reactions of other birds to trembling led me to this conclusion. Like aggressive displays in many other animal species, the trembling stance makes the individual appear larger than its actual size. Also, trembling usually causes other birds to leave the trembling bird's general vicinity. By exhibiting a display to solve disputes, as opposed to fighting, the bird gains a very valuable advantage. Being able to avoid fights, and potential injury, increases an animal's potential fitness enough to offset the energetic costs of trembling.

Introduction

The trembler belongs to the family Mimidae, which includes mockingbirds and thrashers. This species, *Cinclocerthia ruficauda*, is endemic to the island of Dominica, and has acquired a very peculiar trembling behavior, for which it is named. It is an olive-brown bird, with beady yellow eyes. The beak is black and greatly elongated, more so in females than males. While trembling, the bird cocks its tail up and holds its wings away, and slightly below, its body. The actual trembling behavior consists of rapidly vibrating the wings; sometimes the tail is incorporated into the behavior as well. The purpose of this behavior has remained a mystery for several reasons. Due to its limited range, very little study has been done on this bird. Also, the behavior does not seem to be associated with any particular activity, so it has been difficult to determine the true purpose behind this behavior.

There was one fairly extensive study performed in 1968. (Zusi 1969) Zusi did a great deal of general observations on the trembler, focusing on feeding behaviors and adaptations. He believed the trembling behavior was related to aggression. Many other birds in this family exhibit a wing twisting or flashing behavior, for example the Northern Mockingbird, *Mimus polyglottis*. These species usually possess color bands on their wings, so the purpose clearly lies in the visual shock of the color flashes to startle others. Many other species use similar shock markings to deter predators; examples of this are eyespots and disruptive coloration. Tremblers have solid coloration; the only shock trembling creates is due to movement or enhancement of their apparent body size. This behavior clearly creates some sort of energetic cost, so the behavior must infer some benefit large enough to outweigh the cost. My hypothesis supports the previous theory that trembling is an aggressive behavior. The incurred benefit is that individuals are able to avoid conflict and potential injury, thereby increasing their potential fitness.

Material and Methods

I evaluated this problem using two different methods. The first involved the creation of a model trembler. The idea behind this method was that the reactions of tremblers and other birds to the model would give me an indication to the purpose behind trembling. The body of the model was a 6" length of wooden ruler. The head was mounted on the front of the ruler; it consisted of a piece of foam covered with pantyhose and stuck on a stick. The protruding stick was colored black to represent the beak, and yellow-beaded pins were added for eyes. Two sticks projected back from the head of the ruler at about 40° angles from the body. The wings were mounted upon these sticks in such a way that they were able to move freely. A fishing line was taped to the inside of each wing, pulling on these strings caused the wings to tremble. The tail was cocked up and supported with a stick. The wings and tail were composed of styrofoam and covered in brown paper that was cut to resemble feathers. The rest of the model was covered in the same brown paper to resemble the distinctive olive-brown natural coloration of tremblers. I mounted this model in a tree, and caused it to tremble whenever any bird came near. The model obviously did not appear life-like enough and, therefore, did not elicit any response from tremblers or any other birds.

The second method was general observation. My observations were acquired in secondary, transitional rain forest. I performed observations throughout the day whenever a trembler was spotted, but the bulk of my observations were carried out in the morning between six and eight am. While observing, I noted any interactions between tremblers, or between a trembler and another species of bird.

Results

Trembling behavior occurs most often directly after landing. I would estimate that a bird exhibited trembling behavior at least 70% of the time directly after landing. Many times a trembler would land and tremble when there were no other birds obviously within its vicinity, but I do not know how close a bird must be for a trembler to react to it. I never observed a bird trembling while it was eating. I did observe a trembler land in a tree with several bananaquits and begin to tremble; the bananaquits immediately flew away. The duration of trembling varied considerably, but I did not notice any particular situations being associated with longer or shorter bouts of trembling.

I observed two types of reactions when two or more tremblers landed in the same tree. In one instance, the second, third, and fourth birds to arrive in the tree trembled upon landing. Two of these quickly flew away when they noticed a trembler was already present in the tree. The fourth bird remained in the tree for several minutes before flying away. The first bird never trembled throughout the entire duration of the interaction. I only observed this situation on one occasion. On three different occasions, I observed a second trembler landing in a tree where a first trembler was already perched. The birds commenced hopping around the tree from branch to branch, always maintaining at least six inches between birds. There was never any trembling associated with this behavior, and it would last for approximately three to five minutes. Then one bird would tremble and the other would fly away or they would perch on opposite sides of the tree and ignore each other for a few minutes. After a few minutes of stillness, one bird would begin the hopping again, this time interspersed with trembling, and the other bird would fly away.

Discussion

I believe I found evidence to support the theory that trembling is an aggressive behavior. Like most aggressive displays, trembling creates an illusion of larger size and allows the animal to avoid conflicts. By lowering the wings and cocking the tail, tremblers appear larger than their actual size when trembling. I never observed two tremblers engaged in fighting. The majority of the time, trembling is observed immediately after a trembler lands. I believe the reason for this is that the bird has just entered into a new territory and wants to establish dominance; it attempts to do this by trembling. The most definitive support I have found for this theory is the observation involving bananaquits. The bananaquits did not fly out of the tree until the trembler trembled, thereby asserting its dominance or issuing a threat. Differences in duration of the trembling behavior may indicate the degree to which a bird feels threatened, but I did not find any support or opposition for this theory.

These observations were taken during the trembler's breeding season, which lasts from March to August. (Evans 1990) I was not able to become familiar enough with this species to positively sex them, and very little is known about trembler mating behavior for reference. Therefore, some of the behaviors I observed might be affected by mating rituals and this must be taken into account when analyzing trembler-trembler interactions.

Using this aggressive display, tremblers are able to avoid many fights. The benefit of avoiding these fights may be enough to balance the energetic cost incurred by the trembling behavior. This evolutionary plan of avoiding fights unless absolutely necessary is often termed "dove" strategy. (Davies, 1993) Tremblers may also be able to sustain this energetically costly behavior because resources are abundant, predators are few, and competitors do not appear to impose any great pressure upon individuals of this species.

Wing movement behaviors are fairly common within the mimid family, and can account for the origination of trembling behavior. At some point this behavior was altered to not include color displays and the motion became greatly exaggerated. This behavior may have been exaggerated through evolution to reduce ambiguity, thereby making the purpose of the behavior more clear and, therefore, more useful. (Davies 1993)

Despite the short duration of this study, it is obvious that trembling behavior is an aggressive display. Future studies could possibly focus on determining whether different situations would cause different duration bouts of trembling. It is also important to learn more about the breeding behaviors of this species. I observed several sites that I believe to be nests, but I never observed any behavior that could be obviously defined as part of a mating ritual or nest building activity.

Literature Cited

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