

Some Venezuelan wild bird species that box against their own reflections

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ABSTRACT: Data about shadow boxing behavior in Neotropical wild birds is almost absent. A total of 16 novel wild bird species were found performing shadow boxing behavior in northern Venezuela. Families Trochilidae, Picidae, Tyrannidae, Corvidae, Turdidae, Mimidae, Thraupidae, Emberizidae, and Parulidae were represented, with Trochilidae and Tyrannidae reported for the first time. Reflecting surfaces were car components, home windows, glass sliding doors, and a stainless steel pot. As expected, date of records and breeding season information matched for all species. Nonetheless, the White-vented Plumeleteer *Chalybura buffonii* behavior does not appear to be related to its breeding condition. Instead, this species shadow box to defend a food source. While most birds shadow box with their beak, wings and feet, Trochilidae species developed aerial displays, and beat their reflections with the breast and beak. Two records involved female individuals. Recorded information noticeably improves the previous knowledge of avian shadow boxing behavior in Venezuela and the Neotropical region.

KEY-WORDS: agonistic behavior, avian behavior, bird aggressions, mirror reflections, shadow boxing.

Avian “shadow boxing” has been described as a behavior where birds attack, fight, call, peck, display or fly against their own reflections on shiny surfaces, such as mirrors and windows, as well as chrome bumpers or polished surfaces of vehicles, in an attempt to defend their territory against a supposed intruder (Roerig 2013, Mayntz 2018). Given that most organisms respond to mirror reflections as if their image represented another individual (Gallup-Jr. 1968), territorial birds assume it is a rival bird and attack the reflection to drive it away, particularly during breeding season when birds competitive drive is highest (Temby 2003, Mayntz 2018). In response to the supposed intruder, birds fly against the reflection, peck at it, rake it with their talons, scratch it with their nails, or beat it with their wings. While these actions apparently do not cause severe injuries, they can lead to exhaustion, and make the bird more vulnerable to diseases, malnutrition, predators, and even cause its death. After a complete day of shadow boxing, a Common Starling *Sturnus vulgaris* was found dead the next morning in Europe (Gough 1936). The degree of aggression and duration of the attacks vary for each bird species and even for individual birds, but usually disappear after the breeding season has ended (Mayntz 2018). Although this behavior is expected from males, females are occasionally involved (Robertson 1935, Reed 1938, Sutton 1947), sometimes in company of their males (Roerig 2013).

While the “shadow boxing” term was coined by Dickey (1916), its formal reports started with Allen (1879) as an “odd behavior” observed in a Robin *Turdus migratorius* and an American Yellow Warbler *Setophaga aestiva* from North America. Recent data about wild bird species that are known to attack themselves as reflections involve 143 bird species worldwide (Roerig 2013). Nonetheless, that inventory only contains an isolated report for the Neotropical region, corresponding to the Smooth-billed Ani *Crotophaga ani* (Davis 1940). In Venezuela, the Great Thrush *Turdus fuscater* is the only species known to shadow box (Vereá *et al.* 2016). In this context, the current paper aims to improve the almost absent information about this topic in Venezuela and the Neotropical region.

Between December 2014 and January 2018 visual observations concerning shadow boxing behavior in wild bird species were randomly recorded. All data came from two close localities in Cordillera de la Costa mountains, southeast suburbs of Caracas, El Hatillo County, Miranda state, northern Venezuela: Los Naranjos farm (10°26'14"N; 66°47'27"W), a disturbed area about 900 m a.s.l.; and El Volcán area (10°25'30"N; 66°51'04"W), a relic cloud forest about 1320 m a.s.l. For each case, a reflecting surface was recorded. Due to strong relation between shadow boxing behavior and breeding season, the date of records (month) were compared with the



Figure 1. After noticing its reflection (A), a Rusty-margined Flycatcher *Myiozetetes cayanensis* pecks at it, scratches it with its nails (B) and beats it with its wings (C). Photo author: C. Vereá.



Figure 2. A Tropical Parula *Setophaga pitaiayumi* rests on a car rear view mirror while shadow boxing in northern Venezuela. Photo author: E. Mayor.

breeding periods of the bird species in Cordillera de la Costa bio-region based on Schäfer & Phelps (1954), Vereá *et al.* (2009, 2016) and Vereá (2016). Additionally, information associated to breeding behavior, such as nest presence, birds carrying nest material and/or food for fledglings were recorded as evidence of breeding activity. When possible (*e.g.*, dichromatic species) the bird sex was reported. Typical bird attack elements (*e.g.*, beak, wings, feet, others) were also recorded.

A total of 16 novel wild bird species were found performing shadow boxing behavior (Table 1; Figs. 1 & 2). Families Trochilidae, Picidae, Tyrannidae, Corvidae, Turdidae, Mimidae, Thraupidae, Emberizidae, and Parulidae were represented. According the information harbored by Roerig (2013), Trochilidae and Tyrannidae are reported for the first time. In most cases (12) the reflecting surfaces were vehicle components (windows, windscreens, rear view mirrors, and/or polished surfaces); four records were associated to home windows; other four records were associated to a glass sliding door; and a curious case involved a stainless steel pot. With the exception of the latter, all mentioned reflecting surfaces have been typically used by birds for shadow boxing (Roerig 2013). In all cases, one individual was involved, but the Rusty-margined Flycatcher *Myiozetetes cayanensis* eventually included two, undoubtedly male and female. After shadow boxing, both Rusty-margined Flycatchers

flew up to the branch tree where their nest was built. Also, a single female of the Sooty-capped Hermit *Phaethornis augusti* with an active nest was recorded. Although this hermit does not show sexual dichromatism/dimorphism, it is a communal display (lek) bird. Thus, the entire reproduction effort rests on the female (Vereá 2016). Female taking part of shadow boxing events represents only 13% of total species (Roerig 2013).

As expected, date of records and breeding season information matched in all species (Table 1). Additionally, Sooty-capped Hermit, Red-crowned Woodpecker *Melanerpes rubricapillus*, Social Flycatcher *Myiozetetes similis*, Rusty-margined Flycatcher, Great Kiskadee *Pitangus sulphuratus*, Spectacled Thrush *Turdus nudigenis*, Pale-vented Thrush *Turdus leucomelas*, and Black-faced Grassquit *Tiaris bicolor* had nests in the area. Likewise, the Burnished-buff Tanager *Tangara cayana*, Spectacled Thrush, Pale-vented Thrush, Black-striped Sparrow *Arremonops conirostris*, Blue-black Grassquit *Volatinia jacarina* and the Tropical Parula *Setophaga pitaiayumi* were usually observed carrying food for fledglings and/or materials for nest construction at the same period of boxing. Nonetheless, the White-vented Plumeleater *Chalybura buffonii* behavior does not seem related to its breeding season. Instead, this species was supposedly shadow boxing to defend a food source. A hummingbird food dispenser was daily defended for the mentioned hummingbird. All conspecific hummingbirds (Trochilidae) or others (*e.g.*, Bananaquit *Coereba flaveola*) were toughly repelled when they tried to approach the food dispenser. From time to time, the White-vented Plumeleater flew in front of a nearby glass sliding door and attacked its own reflection as well. On the other hand, a few records of shadow boxing were recorded outside the breeding season (Table 1), corresponding to the Rusty-margined Flycatcher (October–November), Green Jay *Cyanocorax yncas* (November), and the Burnished-buff Tanager (December), despite elsewhere shadow boxing behavior is known to occur at any time of the year (Temby 2003, Roerig 2013).

While most birds shadow box aggressively with their beak, wings and feet, Trochilidae species developed aerial displays, and beat their reflections with the breast and

Table 1. Bird species performing shadow boxing behavior in Venezuela. Data included previous report of the Great Thrush, Mérida region, Andean mountains of Venezuela (Verea *et al.* 2016). Breeding season data for Cordillera de la Costa bio-region according to Schäfer & Phelps (1954), Verea *et al.* (2009, 2016) and Verea (2016). Taxonomy sequence and nomenclature follow Remsen-Jr. *et al.* (2018).

Family/Species	Reflecting surface	Month(s) of record(s)	Breeding season
Trochilidae			
Sooty-capped Hermit (♀) <i>Phaethornis augusti</i>	Glass sliding doors.	January–June	December–July
White-vented Plumeteer (♂) <i>Chalybura buffonii</i>	Glass sliding doors.	January–March	Throughout the year
Picidae			
Red-crowned Woodpecker (♂) <i>Melanerpes rubricapillus</i>	Car components: windows, windcreens, and polished surfaces.	March	November–July
Tyrannidae			
Social Flycatcher <i>Myiozetetes similis</i>	Car components: windows, windcreens, rear view mirrors, and polished surfaces; home windows.	February–March	January–August
Rusty-margined Flycatcher <i>Myiozetetes cayanensis</i>	Car components: windows, windcreens, rear view mirrors, and polished surfaces; home windows and glass sliding doors.	February–March; May–June; October–November	March–July
Great Kiskadee <i>Pitangus sulphuratus</i>	Car components: windows, windcreens, rear view mirrors, and polished surfaces.	April–May	March–June
Corvidae			
Green Jay <i>Cyanocorax yncas</i>	Home windows.	June; November	April–June
Turdidae			
Great Thrush (♂) <i>Turdus fuscater</i>	Car components: windows, windcreens, and rear view mirrors.	August	February–October
Spectacled Thrush <i>Turdus nudigenis</i>	Car components: windows and windcreens.	April–July	February–August
Pale-vented Thrush <i>Turdus leucomelas</i>	Car components: windows and windcreens.	May–July	Throughout the year
Mimidae			
Tropical Mockingbird <i>Mimus gilvus</i>	Car components: windows, windcreens, rear view mirrors, and polished surfaces; home windows.	March	Throughout the year
Thraupidae			
Burnished-buff Tanager <i>Tangara cayana</i>	Car components: windows and rear view mirrors; glass sliding doors.	February–March; December	March–May
Black-faced Grassquit (♂) <i>Tiaris bicolor</i>	Stainless steel pot.	March–April	May–September

Family/Species	Reflecting surface	Month(s) of record(s)	Breeding season
Blue-black Grassquit (♂) <i>Volatinia jacarina</i>	Car components: rear view mirrors.	June	April–October
Emberizidae			
Black-striped Sparrow <i>Arremonops conirostris</i>	Car components: windows, and rear view mirrors.	May–June	May
Parulidae			
Tropical Parula <i>Setophaga pitiayumi</i>	Car components: rear view mirrors.	June–July	March–August
Three-striped Warbler <i>Basileuterus tristriatus</i>	Car components: rear view mirrors.	June	March–June

beak. The White-vented Plumeleteer was flying steadily in front of its reflected image, and suddenly attacked it with a single breast and/or beak stroke. After a couple times, the hummingbird gave up and returned to its original spot. This strategy was observed two/three times a day. The Sooty-capped Hermit was less aggressive. When this species confronted its image, it moved up-and-down, and/or side to side. Simultaneously, the hummingbird uttered a couple “chip” warning notes. Then, it suddenly moved forward and touched the glass with its beak. After the contact, it moved backward and repeated the frontal attack one more time. Finally, it flew away.

Recorded information increases the data about wild bird that are known to performing shadow boxing behavior worldwide and noticeably improves its knowledge in Venezuela and the Neotropical region.

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