

Distraction display of the southernmost subspecies of the Golden-crowned Warbler *Basileuterus culicivorus azarae* (Aves: Parulidae) and a need for more detailed documentation of paratreptic behaviours

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Received: 21 October 2016 / Revised: 16 December 2016 / Accepted: 12 January 2017 / Published online: 30 January 2017
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Abstract Distraction displays or paratreptic behaviours are nest protection behaviours designed to lead predators away from an active nest. The reason for the widespread presence of terrestrial distraction displays in the largely arboreal Parulidae has been the subject of much debate, and a terrestrial or semi-terrestrial ancestor has been postulated to explain it. Recent phylogenetic analyses provide some support for this theory, but distraction displays in the Parulidae remain poorly documented and are often inaccurately and abruptly dismissed with misapplied terms such as “injury-feigning”. An observation of distraction display in the southern *azarae* subspecies of the widespread Neotropical species, Golden-crowned Warbler *Basileuterus culicivorus*, showed that such behaviours are far more complex and multi-faceted than currently understood. The distraction display of this subspecies exhibits elements of injury-feigning, chick simulation, advertising and, perhaps, eccentric deportment. Given the possible ancestral origins of such behaviours, it is suggested that the careful documentation and description of such behaviours in Parulidae is warranted and that they may potentially assist in shedding light on the evolutionary history of the family.

Keywords Injury-feigning · Nest protection · Paratrepsis · Wood-warblers

In birds paratreptic behaviours (or distraction displays as they are commonly known) are nest protection behaviours used by

parent birds to lead potential predators or threats away from an active nest (Armstrong 1949, 1954, 1956). This is commonly interpreted as injury simulation or injury-feigning, though it can also encompass a range of other nest defence techniques defined by Armstrong (1949) as chick-simulation, eccentric deportment and advertising, or any combination of the above.

Distraction displays are widespread in the Parulidae (Skutch 1955; Ficken and Ficken 1962) and have been reported for a great number of genera. The taxonomy of the Parulidae has undergone numerous recent revisions (Klein et al. 2004; Escalante et al. 2009; Lovette et al. 2010) but amongst the 14 genera now considered to be present in the Neotropics (SACC 2016), distraction displays have been reported from the following: *Basileuterus* (Ffrench 1991; Griffiths 2016), *Cardellina* (Grimes 1936; Bulmer 1966), *Geothlypis* (Laskey 1936; Sick 1993), *Helmitheros* (Hanners and Patton 1998), *Mniotilta* (Smith 1934), *Myioborus* (Barber et al. 2000), *Myiothlypis* (Sick 1993; Belton 1994; Smith 2006; Schulenberg and Johnson 2013), *Oporornis* (Bent 1953), *Parkesia* (Craig 1981; Robinson 1990), *Protonotaria* (Grimes 1936), *Seiurus* (Hann 1937) and *Setophaga* (Grimes 1936; Mendall 1937; Skutch 1955; Mayfield 1960; Morse 1969). Distraction displays are apparently poorly developed in *Vermivora* (van Tyne and Sutton 1937) and I have been unable to find any published reference to such behaviour in *Leiothlypis*.

That such displays would be so widespread in Parulids even in highly arboreal species has resulted in considerable discussion as to their origin. Armstrong (1954, 1956) had postulated that this may be because of the higher density of snake predators in the Americas, but if this were to be true, then the same would likely be true in other families of New World birds. Ficken and Ficken (1962) considered that the reason was more likely related to a common ancestor that was terrestrial or semi-terrestrial in behaviour. It is perhaps

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of significance then that Lovette et al. (2010) found the highly terrestrial Ovenbird *Seiurus aurocapilla* as the most basal species in the family, and other strongly terrestrial genera such as the waterthrushes *Seiurus* sp. and Worm-eating Warbler *Helmitheros vermivorus* as rooted close to the base of the core Parulidae tree.

Although distraction displays are fairly well known in many species that breed in North America, they have rarely been described in any detail for Neotropical species. The Golden-crowned Warbler *Basileuterus culicivorus* is the most widespread member of its genus occurring in 13 subspecies from central Mexico south to Uruguay and east-central Argentina (Curson 2010). It has been noted to “feign injury to distract predators from the nest” (Curson et al. 1994; Curson 2010), but to my knowledge, the only description of this procedure available in the literature refers to the subspecies *B. c. olivascens* by Ffrench (1991) who stated briefly that “it performs an elaborate distraction display when flushed from its nest, dragging its wings along the ground, fluttering and chirping plaintively at a distance of only a few feet”.

Observations of a distraction display in the southernmost subspecies *Basileuterus culicivorus azarae* Zimmer 1949 revealed its components to be far more complex than described by Ffrench (1991) and to differ in key details. *B. c. azarae* ranges from southwestern Rio de Janeiro state in southern Brazil, south to Uruguay and central-eastern Argentina (Buenos Aires Province) and west through the Brazilian states of São Paulo and Mato Grosso to eastern Paraguay (Zimmer 1949). A ground nester, it is an abundant inhabitant of forest undergrowth over much of its range. Details of a distraction display observed in secondary Atlantic Forest at Hotel Tirol, Itapúa department, southern Paraguay at around 3 pm on 14 October 2016 are reported below:

The observer was alerted to the presence of a nest with young by an adult bird carrying food, and following the adult in search of the nest was what initiated the alarm response by the pair. Alarm calling consisted of frantic repetitions of a high-pitched *pist* note at an accelerated rate and was performed by both members of the pair from a height of approximately 2–3 m whilst flitting about and constantly lifting the wings in an agitated manner. Both birds had raised the crown feathers so that the orange crown was conspicuously more visible than under normal conditions.

Upon approach to where the nest was located, the defensive response intensified, with one member of the pair appearing to “fall” from the branches. This consisted of a clumsy and rapid descent towards the ground along thin branches and saplings, with wings flailing and body in a horizontal posture, giving the impression that the bird was injured or otherwise incapable of maintaining its position in the trees. Upon dropping to the ground, it instantly adopted a hunched posture, with head held below the horizontal, and half fanning the tail and drooping (not opening) the wings began to scurry mouse-

like along the ground away from the observer. The retreat was in an erratic fashion, fairly rapid, and involved movements in and out of vegetation cover with the occasional raising of a single wing. If this failed to produce a follow response the bird would return to the trees and repeat. The bird on the ground performing the display gave an intermittent nasal *jewp* call more typical of the standard contact call of the species. Only one member of the pair performed the display at any one time, the other member remaining in the trees at a height of around 2–3 m and continuing to alarm call; however, it was not possible to confidently assign behaviours to one or both sexes in this sexually monochromatic species. These behaviours were observed over a dozen times and a brief video showing some of the key aspects of the display was recorded (FAUNA Paraguay 2016).

Wing and tail movement play a major role in social interactions and display in Parulidae (Sick 1993), and the distraction display described here is loosely consistent in its basic concept with that of other Parulids in that it involves a “free-falling” component and a terrestrial component. However, despite the tendency to dismiss such displays as simple “injury-feigning”, the components involved in the distraction display of this species are in fact far more complex than that would suggest, and involve several of the distraction display types defined by Armstrong (1949). The “fall from the sky” element, common to certain arboreal Parulids (Grimes 1936), is indeed akin to injury-feigning, but the rapid, scurrying in and out of cover was more similar to the behaviour of a non-volant juvenile bird (i.e. chick simulation), or a small rodent, perhaps mimicking an alternative prey source to distract the threat (and potentially therefore eccentric department). Occasional wing raising during this terrestrial component may be interpreted as injury-feigning by some observers, but this was so infrequent yet so eye-catching that it seems at least as likely to be advertising, drawing attention to the bird on the ground. Advertising components were also present in the constant alarm calling and wing-flicking deployed by the pair when in the trees, with the intent to distract the attention away from the vulnerable nest to the coordinated actions of the defending pair.

Such behaviours are common, conspicuous and easily observed, and their complexity surely goes beyond simple “injury-feigning” in most cases. Despite this, the lack of a properly documented taxonomic inventory of distraction behaviours by Parulids in the literature is perhaps based on the assumption that there is a certain uniformity in their approach that can be adequately summarized with the word “injury-feigning”. As the complexity of the techniques employed here illustrates, this idea is unfounded and there is great scope for examining the techniques employed by different species to deduce to what extent they vary interspecifically or even intraspecifically under differing conditions. I encourage future authors to carefully and thoroughly document their

observations of distraction displays in Parulidae, particularly in the Neotropics where it seems that little or no data is currently available and to use the definitions proposed by Armstrong (1949) as a descriptive base. As well as adding a fascinating element to our understanding of behavioural complexity in the family, if such behaviours are indeed retained from a terrestrial or semi-terrestrial ancestor as Ficken and Ficken (1962) supposed, they may even help to shed some light on the taxonomic relationships and evolutionary history of this charismatic group.

Acknowledgements Thank you to Roberto Dema for his company in the field. I am grateful to the PRONII Project of CONACYT for their support and to the anonymous reviewers for their helpful comments.

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