Evolutionary Ecology (2024) 38:405–408
https://doi.org/10.1007/s10682-024-10302-7

COMMENT

Fledgling integration in altricial birds: a response to Redondo and Amat

Facundo Fernandez-Duque[1] · **Mark E. Hauber**[2]

Received: 15 February 2024 / Accepted: 1 May 2024 / Published online: 15 May 2024

Abstract
Redondo and Amat (Nest switching vs. nest integration: a comment on Fernandez-Duque et al. Evolutionary Ecology, 2024) commented on our recent report of freely moving altricial fledglings incorporating themselves into the brood of a conspecific nest with offspring too young to fly. The authors bring up both related examples of this behavior in other avian lineages and several conceptual issues worth discussing. We reflect on these behavioral cases performed by ontogenetically and evolutionarily distinct species, as well as the implications of human influences on nesting, fledging, and other distinct behavioral stages.

We thank Drs. Tomás Redondo and Juan Amat for their attention to our original article (Fernandez-Duque et al. 2023) and for providing their perspective and background on avian offspring-parent interactions, parasitism, and adoption. These authors' comments bring forward several important points to be considered, including the use of non-uniform ontogenetic terminology in different taxonomic clades and the consideration of anthropogenic effects on wild animals' behaviors. Their points are relevant both to our study and more generally when discussing the study of, and reporting on, the evolution of animal evolutionary ecology.

The comment by Redondo and Amat (2024) states that the fledgling nest-integration behavior we observed in red-winged blackbirds (*Agelaius phoeniceus*) is not novel to science, as similar behaviors have already been reported for several other species of birds. Indeed, the authors list over a dozen studies on avian species, of which, however, all but one are not altricial. This brings up the question of whether the similarity of brood amalgamation behavior by mobile hatchlings, still parentally-dependent but also mobile semialtricial young, and definitionally mobile fledglings (potentially parentally-independent altricial

✉ Facundo Fernandez-Duque
facundo2@illinois.edu

[1] Program in Ecology, Evolution, and Conservation, University of Illinois Urbana-Champaign, Urbana, IL 61820, USA

[2] Advanced Science Research Center and Program in Psychology, Graduate Center of the City University of New York, New York, NY 10031, USA

juveniles), should be considered the same behavioral phenomena, given the dramatic differences in the course of early life development (reviewed in pages 468–478 of Gill 2006) and the resulting life history tradeoffs between species with different developmental modes (reviewed in Chap. 17 of Gill 2006). Traditionally, ornithologists have categorized avian development modes into six categories (i.e., superprecocial, precocial, subprecocial, semi-precocial, semialtricial, and altricial; reviewed in pages 468–478 of Gill 2006) and this is the nomenclature system that we utilized in our paper and the current comment. However, it should be noted that recent literature integrating changes in modern phylogenies suggests a novel suite and names of developmental modes (i.e., super-precocial, precocial, semi-precocial, semi-altricial, altricial, and super-altricial; Botelho and Faunes 2015). For this comment, our references to "altricial" and "semi-altricial" simply refer to the most and second most altricial developmental modes, respectively.

We still consider our reported nest-joining behavior by fledgling altricial birds as novel, and both ontogenetically and evolutionarily distinct from prior reports. Accordingly, whereas there is relevant literature for non-altricial chicks regarding brood integration with foreign families, as Redondo and Amat have detailed, it does not seem fitting to apply the same cost-benefit analysis to an altricial system. In these authors' given examples, where an individual enters the territory and joins the brood of a conspecific but not the nest itself, the parental care cost-implications of such a behavior are different for more precocial birds (that become mobile soon after hatching) than for our focal species, a highly altricial species (that hatches blind and is completely dependent, remaining confined to a nest until much later in development). Moreover, our report presents a record of this behavior in a passerine while all the presented cases are from non-passerines, adding another layer of comparative complications when lumping these behaviors.

A second point that might be just as important as evolved ontogenetic effects, is regarding the interpretation of behaviors of wild animals that have been influenced by humans. Recently, much attention has been brought to this in our research through the STRANGE framework (see Webster and Rutz 2020). This framework highlights the importance of evaluating how our own human biases might influence the animals we study and the results we obtain. In the sole altricial nest-switching fledgling example listed by Redondo and Amat, the Alpine swift (*Tachymarptis melba*) nested in human-made structures, where the nests were more protected from the weather, were built frequently at unnaturally close distances from each other, and were likely more conspicuous, and the young had artificially built and finished surfaces to traverse. Therefore, we ask whether the behavior observed under these anthropogenic conditions should be compared to more natural cases. We admit that while the red-winged blackbirds we studied in the Central USA nested on their natural substrate, they were still certainly in close contact with anthropogenic structures (several meters away in many cases) and we may have erred in not discussing this in the original report. This is also an important topic to consider as we consider the role of conservation aspects of animal behavior itself (Blumstein and Fernández-Juricic 2010): for example, should behaviors of species nesting in human-altered habitats be considered a "natural suite of behaviors?" There is certainly a great deal of literature highlighting how humans can influence the behavior of study organisms (reviewed in Webster and Rutz 2020; discussed in pages 71–78 of Numan 2020; Alfred and Baldwin 2015; O'Neill et al. 2018; Kreger et al. 2004; Roberts et al. 2011).

The authors' other comments also consider the provisioning of food by parents to unrelated young in the brood as food kleptoparasitism. We refrained from the use of klepto- or

brood "parasitism" to describe our observations because we did not know the genetic identity of the chicks and the putative foster parents and, thus, could not surmise whether they were related to the provisioning adults. Anecdotally, we suspect that our examples may have been cases of pseudoparasitism, whereby fledglings sired by the same territorial adult male are integrating into a nest tended by an unrelated adult female. We hope to shed more light on this using spatial and genetic analyses in the years to come.

Finally, we would like to clarify that we did not state "that nest switching by young should occur more frequently in non-colonial birds, as colonial birds have more refined mechanisms for recognizing their offspring," but rather said that while red-winged blackbirds "might seem like an unexpected species for the occurrence of this behavior, given that females on the same male's territory are largely unrelated and aggressive towards intruders (Searcy 1986), it could be that poor offspring recognition (Edwards et al. 1999) and the close proximity of nests at different reproductive stages provide an occasional opportunity for this behavior to appear." While this may seem like semantics, we ought to point out that we have tried to keep the language in the manuscript neutral with respect to function and adaptiveness, and simply assess patterns of this behavior in the discussion.

We also consider that in future discussions it might be useful to distinguish between terms used by the original paper in which they appear and proposed new proposed terms. This should help in making the proposed changes clearer and in understanding how these behaviors fall into logical groupings.

In response to the insightful commentary by Redondo and Amat, we recognize the importance of integrating existing literature and perspectives into our study on nest-switching behaviors among altricial and non-altricial bird species. Our findings and this exchange underscore the nuanced nature of these behaviors, emphasizing the need for careful consideration of terminology, evolutionary contexts, and the developmental and fitness impact of anthropogenic factors. We are grateful for the opportunity to refine our understanding and contribute to the broader discourse on animal evolutionary ecology. Moving forward, it will be crucial to consider both ontogenetic and anthropogenic influences in the study of animal behaviors, particularly in a changing world. We also acknowledge the value of genetic and spatial analyses to deepen our insights into these complex adult-juvenile interactions. Our exchange represents a step towards a more unified understanding of animal behavior, encouraging further research into and discussion regarding this dynamic field.

Acknowledgements We thank N. Antonson, the editors, and referees of this journal for their suggestions.

Author contributions Both authors contributed to writing this article.

Data availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

References

Alfred J, Baldwin IT (2015) New opportunities at the wild frontier. eLife 4:e06956

Blumstein DT, Fernández-Juricic E (2010) A primer of conservation behavior. Sinauer Associates, Oxford University Press, Sunderland, MA
Botelho JF, Faunes M (2015) The evolution of developmental modes in the new avian phylogenetic tree. Evol Dev 17(4):221–223
Edwards S, Messenger E, Yasukawa K (1999) Do red-winged blackbird parents and their nestlings recognize each other? J F Ornithol 70:297–309. https://doi.org/10.1007/BF00299945
Fernandez-Duque F, Huerta EY, Lawson SL, Chikoti S, Hauber ME (2023) Nest integration: a novel form of food acquisition by altricial fledglings. Evol Ecol 37(5):859–869
Gill FB (2006) Third Edition). Ornithology. W.H. Freeman and Company, New York, NY
Kreger MD, Estevez I, Hatfield JS, Gee GF (2004) Effects of rearing treatment on the behavior of captive whooping cranes (*Grus americana*). Appl Anim Behav Sci 89(3–4):243–261
Numan M (2020) The parental brain: mechanisms, development, and evolution. Oxford University Press, New York, NY
O'Neill SJ, Williamson JE, Tosetto L, Brown C (2018) Effects of acclimatisation on behavioural repeatability in two behaviour assays of the guppy *Poecilia reticulata*. Behav Ecol Sociobiol 72:1–11
Redondo T, Amat JA (2024) Nest switching vs. nest integration: a comment on Fernandez-Duque. Evol Ecol. https://doi.org/10.1007/s10682-024-10287-3
Roberts LJ, Taylor J, De Leaniz CG (2011) Environmental enrichment reduces maladaptive risk-taking behavior in salmon reared for conservation. Biol Conserv 144(7):1972–1979
Searcy WA (1986) Are female red-winged blackbirds territorial? Anim Behav 34:1381–1391. https://doi.org/10.1016/S0003-3472(86)80209-3
Webster MM, Rutz C (2020) How STRANGE are your study animals? Nature 582:337–340