



Peer Community In Ecology

Touchy matter: the delicate balance between Morgan's canon and open-minded description of advanced cognitive skills in the animal

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Benjamin G. Farrar (2020) Evidence of tool use in a seabird? Missing preprint_server, ver. Missing article_version, peer-reviewed and recommended by Peer Community in Ecology. [10.31234/osf.io/463hk](https://doi.org/10.31234/osf.io/463hk)

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In a recent paper published in PNAS, Fayet *et al.* [1] reported scarce field observations of two Atlantic puffins (four years apart) apparently scratching their bodies using sticks, which was interpreted by the authors as evidence of tool use in this species. In a short response, Benjamin Farrar [2] raises serious concerns about this interpretation and proposes simpler, more parsimonious, mechanisms explaining the observed behaviour: a textbook case of Morgan's canon. In virtually all introductory lectures on animal behaviour, students are advised to exercise caution when interpreting empirical data and weighting alternative explanations. We are sometimes prisoner of our assumptions: our desire of beliefs in advanced cognitive skills in non-human species make us more receptive to facts confirming our preconceptions than to simpler, less exciting, interpretations (a phenomenon known as "confirmation bias" in psychology). We must resist the temptation to accept appealing explanations without enough critical thinking. Our students are thus taught to apply the Lloyd Morgan's canon, a variant of one of the most important heuristics in Science, the principle of parsimony or Occam's razor, rephrased by Morgan [3, page 53] in the context of animal behaviour: "In no case may we interpret an action as the outcome of a higher psychical faculty, if it can be interpreted as the outcome of the exercise of one that stands lower in the psychological scale". In absence of evidence to the contrary, one should postulate the simplest cognitive skill consistent with the observed behaviour. While sometimes criticized from an epistemological point of view [4-6], it remains an essential and largely accepted framework of animal cognition. It has repeatedly proved to be a useful guide in the minefield of comparative psychology.

Classical ethology questions related to the existence of, for instance, meta-cognition [7], intentionality or problem solving [8] have been convincingly investigated using this principle. Yet, there is a downside to this conservative approach. Blind reference to Morgan's canon may narrow our theoretical thinking about animal cognition [7,9]. It could be counter-productive to systematically deny advanced cognitive skills in animals. On the contrary, keeping our mind open to unplanned observations, unexpected discoveries, or serendipity [10], and being prepared to accept new hypotheses, sometimes fairly remote from the dominant paradigm, may be a fruitful research strategy. To quote Darwin's famous letter to Alfred Wallace: "I am a firm believer, that without speculation there is no good and original observation" [11]. Brief notes in specialized scientific journals, or even in grey literature (by enthusiast amateur ornithologists, ichthyologists, or entomologists), constitutes a rich array of anecdotal observations. For instance, Sol *et al.* [12] convincingly compared the innovation propensity across bird species by screening ornithology literature using keywords like 'never reported', 'not seen before', 'first report', 'unusual' or 'novel'. Even if "the plural of anecdote is not data" as the saying goes, such descriptions of novel behaviours, even single-subject observations, are indisputably precious: taxonomic ubiquity of a behaviour is a powerful argument in favour of evolutionary convergence. Of course, a race to the bottom, amplified by the inevitable media hypes around scientific articles questioning human exceptionalism, is another possible scientific trap for behavioural biologists in search of skills characteristic of so-called advanced species, but never described so far in supposedly cognitively simpler organisms. As stated by Franz de Waal [9]: "I have nothing against anecdotes, especially if they have been caught on camera or come from reputable observers who know their animals; but I do view them as a starting point of research, never an end point". In the case of the two video observations of puffins apparently using sticks as scratching tool, it must be considered as a mere anecdote unless scientists systematically investigate this behaviour. In his constructive criticism of Fayet et al.'s paper, Benjamin Farrar [2] proposes interesting directions of research and testable predictions. A correlation between the background rate of stick picking and the rate of stick preening would indicate that this behaviour was more likely explained by fluke than genuine innovation in this species.

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Reviews

Evaluation round #1

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Version of the preprint: 1

Authors' reply, 30 January 2020

Dear Prof. Dechaume-Moncharmont,

I would like to thank yourself, Dr Dufour and Dr Taylor for your comments on the article. In-line with Dr Taylor's suggestions I have clarified my use of the word priors, and have made tentative suggestions for how researchers may test whether the puffins were using the sticks with the intention to preen. I have made a couple of suggestions, one involving the continued observation of puffins in the wild and one involving captive animals with access to many sticks, that would open up the possibility for controlled experiments to further test the tool-use hypothesis.

Kind regards,

Ben Farrar

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Decision by [Francois-Xavier Dechaume-Moncharmont](#) , posted 29 January 2020

Minor revision

Dear Benjamin Farrar,

Both reviewers and myself agree that your comment deserves recommendation by PCI Ecology. Could you please modify your MS in line with Alex Taylor's very quick suggestion? I will then write down my recommendation.

Sincerely Yours,
Pr François-Xavier Dechaume-Moncharmont University of Lyon, France

Reviewed by Valérie Dufour, 28 January 2020

Benjamin Farrar suggests that the case of tool used reported in puffins and published in PNAS by Fayet and colleagues is not necessarily evidencing tool use in this group of birds. Farrar suggests that an alternative hypothesis to “tool use” could explain this behaviour. Namely, the bird could have picked up a stick for another purpose and coincidentally happen to need to groom himself at the same moment. I fully agree with this more parsimonious hypothesis and with his other point: only 2 observations were documented over several years in this species. I am shocked that a journal like PNAS accepted to publish this work based on so little behavioural elements, and I think that it is really important to publish B Farrar’s comments of this study.

Reviewed by Alex Taylor, 24 January 2020

This is a fair commentary on the interpretation of the tool-preening behaviour recently reported in Fayet et al (2019). I applaud the author for making a testable prediction for their first critique, namely that the background rate of stick pick up could provide useful data for determining whether stick preening was due to chance or not. I would like to see the author do the same for their second critique, that namely testing if the animal had an intention to preen itself with the stick.

Minor comments I think this sentence could do with some unpacking “This should lead us to have very low priors that a puffin would use a stick to scratch itself”. Not all readers will know what ‘priors’ mean in this sense, and so this should be rephrased so it is clearer what point the author is making