Evidence of tool use in a seabird?

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Fayet, Hansen and Biro (1) provide two observations of Atlantic puffins, *Fratercula arctica*, performing self-directed actions while holding a stick in their beaks. The authors interpret this as evidence of tool use as they suggest that the stick was manipulated towards the birds’ plumage with the specific goal of scratching. While these are interesting observations, the authors do not address a simple and likely explanation of the self-directed actions that does not constitute tool use; that the observations occurred by chance. As such, their conclusions about tool use and cognition in seabirds are premature.

Instead of tool use, the puffins could have been engaging in common self-directed behaviour, such as preening, whilst incidentally holding a stick in their beaks. If the stick did not impede the self-directed behaviour, or produced similar sensory results to it, then the birds would have no need to drop the stick while preening. Under this explanation, the authors conclusions about seabird cognition are premature. And this alternative explanation is both plausible and likely as birds often pick up sticks, even when not building nests (2, 3), and they often engage in self-directed preening. In fact, it would be surprising if the puffins did not occasionally engage in both behaviors simultaneously across the many years of observations in both locations. That Fayet, Hansen and Biro only reported two instances of the behavior across seven years by could even be taken as evidence *against* the hypothesis that puffins use stick tools for body care. The authors may have the data to probe this claim, specifically how frequently the puffins picked up sticks without then performing self-directed actions or nest building. If the only instances of stick pick-ups were followed by scratching then the data become more convincing evidence of tool use, but this analysis is necessary to support the authors’ conclusions.

Furthermore, Fayet, Hansen and Biro (1) implicitly present a strong argument as to why we should be skeptical about the sticks being used as tools to scratch: Most birds can already reach most of their bodies with their beaks. This should lead us to have a very low prior expectation that a puffin would use a stick to scratch itself, when this action is likely both more difficult and less efficient for the puffin: If a hypothesis is unlikely, we should require strong evidence before we accept it. At the very least, before a conclusion of tool use for body care is reached, the authors would need to demonstrate that it is unlikely i) a chance combination of self-directed behaviour and stick holding, and ii) that the goal of the animal was to use the stick in order to scratch itself, which at present is a large and weakly-tested assumption. This assumption will be difficult to test, particularly as the intention to preen is common to Fayet, Hansen and Biro’s tool use hypothesis and the alternative presented here. However, it is possible that with further observations more convincing footage of the sticks being deliberately manipulated to scratch could occur, an effort that could be facilitated by tracking the individuals who Fayet, Hansen and Biro suggest have learned to use the sticks as tools. These “tool-using” individuals should display much more frequent combinations of stick holding and self-directed preening actions than control individuals that display a similar amount of stick holding without preening. Further, converging evidence could be found by giving captive populations of puffins access to many suitable sticks and making similar video observations. And if some of these puffins did then learn to use the sticks to preen, the researchers could then explore the properties of these sticks. For example, do the puffins display any stick preference while preening, e.g. for sticks with sharp ends over blunt ends, that they do not display in other stick holding instances? Either way, many more observations are needed to test the hypothesis of tool-use some degree of confidence.

Finally, it is questionable whether searching for or reporting tool use in an all-or-nothing fashion as, an end in itself, is a promising direction for animal cognition research (see e.g. 4, 5). With enough observations, rare events that can be interpreted as tool use could likely be found for any species that interacts with free objects.

References

1. A. L. Fayet, E. S. Hansen, D. Biro, Evidence of tool use in a seabird. *Proc Natl Acad Sci USA*, 201918060 (2019).

2. B. Heinrich, R. Smolker, “Play in common ravens (Corvus corax)” in *Animal Play*, 1st Ed., M. Bekoff, J. A. Byers, Eds. (Cambridge University Press, 1998), pp. 27–44.

3. I. Sazima, Playful birds: cormorants and herons play with objects and practice their skills. *Biota Neotrop.* **8**, 259–264 (2008).

4. T. Eaton, *et al.*, Bottoms-up! Rejecting Top-down Human-centered Approaches in Comparative Psychology. *International Journal of Comparative Psychology* **31** (2018).

5. F. B. M. de Waal, P. F. Ferrari, Towards a bottom-up perspective on animal and human cognition. *Trends in Cognitive Sciences* **14**, 201–207 (2010).