Tool-use in Charadrii: Active Bait-Fishing by a Herring Gull

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Abstract.—An adult Herring Gull (*Larus argentatus*) was observed baiting Goldfish (*Carassius auratus*) with pieces of bread. Active bait-fishing is mostly known from herons, and a similar behavior was reported in captivity for a Lesser Black-backed Gull (*L. fuscus*). To our knowledge, we report the first record of bait-fishing, and second record of complex tool-use, for the superorder Charadrii under natural conditions. *Received 9 January 2006, accepted 28 March 2006.*

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Published reports of unusual and/or complex behaviors constitute the raw information for a recent research field in animal cognition: the analysis of innovativeness (Lefebvre *et al.* 1997; Reader and Laland 2003). Innovation rates, defined as frequencies of rare behaviors per taxonomic group, are used in comparative tests of theories in neurobiology, behavior, ecology and evolution. Bait-fishing, i.e. using a bait or a lure to attract aquatic prey, is such a rare and complex feeding behavior in birds (Lefebvre *et al.* 2002). This tool use behavior has been repeatedly documented for Ardeidae (six species, reviewed in Zickefoose and Davis 1998; Riehl 2001; Hunter *et al.* 2004). Published records exist for four other bird species only: Black Kite (*Milvus migrans*), Pied Kingfisher (*Ceryle rudis*) and Sunbittern (*Eurypga helias*) (reviewed in Lefebvre *et al.* 2002). For the superorder Charadrii, a single published record relates to an injured, captive Lesser Black-backed Gull (*Larus fuscus*), but no previous account has been recorded under natural conditions. The case of a Herring Gull (*L. argentatus*) using bread baits to seize Goldfish (*Carassius auratus*) is reported here.

OBSERVATION

On 2 July 2005, 15:00-16:00 h, tourists were observed feeding Mallards (*Anas platyrhyncos*) with bread in the largest basin of the *Jardin des Tuileries*, city center of Paris, France. An adult Herring Gull landed on the water next to the ducks. When tourists threw a piece of bread, the Herring Gull caught it, and swam a few meters away, supposedly to eat it. Not much attention was paid to the gull until it seized a 7-9-cm goldfish. At this point, it was hypothesized that the gull was bait-fishing goldfishes with bread. A typical bout involved the gull waiting for bread to be thrown to the ducks. Then it swiftly swam to catch the piece of bread. Holding it in the beak, it retracted 1-2 m away from the ducks, more to the center of the basin. There, it repeatedly dropped the bread in the water and shook it slightly, making the bread break into small pieces. Then the gull remained virtually immobile, holding its neck extended and its head pointed down starring at the pieces of bread. When the bread began to sink, it repositioned it on the surface. When a fish was observed to feed on the bread, the gull stroke in an attempt to catch it. In less than one minute the bread had disappeared, eaten by fish or descended in the water column. The gull waited for another piece of bread, staring at bread providers. Until tourists stopped feeding the ducks, i.e. during about 15 minutes, we observed about ten such bait-fishing attempts. Two attacks were successful and two were unsuccessful. The rest of bait-fishing bouts did not give rise to a strike. The gull never ate the bread, thus

manipulation of the bread was not dunking (Morand-Ferron *et al.* 2004).

DISCUSSION

The only published description of bait-fishing by a Charadrii relates to a captive Lesser Black-backed Gull (Sinclair 1984). This bird was found injured and brought to a wildlife rehabilitation center where it was caged with Kelp (*L. dominicanus*) and Grey-headed (*L. cirrocephalus*) Gulls. In the enclosure, there was a pond with *Tilapia* sp. fishes. Visitors used to give bread chunks to caged gulls. The Lesser Black-Backed Gull was not recorded feeding on bread, but it picked it up, dropped it into the pond and seized fishes coming to feed on it. Kelp and Grey-headed Gulls were never sighted bait-fishing, although they occasionally kleptoparasitized the Lesser Black-backed Gull.

Indeed, tool use in Charadrii is mostly restricted to the common behavior of gulls dropping food items on hard surfaces (Lefebvre *et al.* 2002). This behavior is classified as borderline tool, or proto-tool, use since there is no manipulation of the substrate (i.e., ground) used as a tool (Lefebvre *et al.* 2002). Following this definition, bait-fishing was classified as borderline tool use since, usually, the bait is part of the substrate and is not manipulated directly (e.g., Zickefoose and Davis 1998). However, active bait-fishing is more complex than passive bait-fishing or prey dropping since it involves manipulation of the tool and not of the prey. The description of Sinclair (1984) was the only published report of such a complex tool use for Laridae. Our observation confirms that it occurs not only in captivity but also in the wild. The two other reports of complex tool use for Charadrii relate to Bristle-thighed Curlews (*Numenius tahitiensis*) breaking eggs of albatrosses with coral stones (Marks and Hall 1992) and a captive Eurasian Oystercatcher (*Haematopus ostralegus*) dislodging invertebrates with a stick (in Lefebvre *et al.* 2002).

Laridae have a high innovation rate, with at least 27 innovation reports for the Herring Gull, and 145 reports for the genus *Larus* (L. Lefebvre; unpublished database; examples in Lefebvre *et al.* 1997, 2002). This high innovation rate is congruent with their high propensity to use tools for foraging activities (Lefebvre *et al.* 2002). However, the general, low complexity of tool use in Charadrii is well related to their low relative brain size when compared to other bird taxa (Lefebvre *et al.* 2002). The bait-fishing behavior reported here is one of the most complex tool use described for the parvorder. For instance, species of a closely related parvorder, Ciconiida, have both a higher relative brain size and a higher index of true tool use than Charadriida (Lefebvre *et al.* 2002), with three heron species known to bait-fish actively (reviewed in Riehl 2001).

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