Case report: Prey luring behaviour using beak by little egret *Egretta garzetta*

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Luring and attracting the prey fish through baits has been documented for some birds, especially for the members belonging to heron family (Davis and Zickefoose 1998, Kushlan, 1978). The luring is usually done through several external tools like food particles (ranging from bread pieces to live insects), feathers, leaves and twigs. We report on novel behaviour of a little egret (*Egretta garzetta,* Family Ardidae) using its own beak to lure prey goldfish (*Carrasius auratus*, Family Cyprinidae) in an artificial experimental set up designed to study predator-prey behavioural games. The experimental aviary (7m diameter) contains three equally spaced circular pools (1.52m diameter, 0.6m deep, ~1000 liters, Fig. 1). The pools hold different densities of goldfish (10, 15 or 20) depending upon the experiment. The fish is restricted to upper 15cm of water level through plastic mesh. The pools contain safe but food deprived (covered) and risky but food rich (open) habitats for prey goldfish and represent a natural condition where there is a trade-off between acquiring resources in risky area and keeping safe under protective cover. Goldfish (~5cm, 5-7 g) generally stays under the cover when egret is near or actively foraging in the pool. An automated feeder drops fish food pellets (2mm) at regular intervals.

In the experimental system, the egret typically hunts by waiting on the edge of the pool (or little farther) for the fish to come out of the cover and strikes its beak (ambush). However, one particular egret (male, 475-g) uses its beak dips as bait for luring and capturing the prey (a form of "active baiting", *sensu* Zickefoose and Davis, 1998). The egret stands outside (< 0.3m) the circular pool, often close to the fish feeder, stretches its neck and purposefully and superficially dips and removes its beak tip in water surface to lure hiding goldfish out in the open water (Fig.2). Once the fish takes the bait of beak dips and swims outside the cover, the egret then strikes to catch the prey (Fig.3). The egret repeated this luring behaviour in all three pools in experimental arena. Generally, the prey goldfish cannot detect the egret standing outside the pool. This deliberate beak dip is normally done once or twice per foraging session lasting few seconds though sometimes it is repeated frequently. Using this technique, the egret was successful in catching prey goldfish suggesting that it could be an additional strategy for maximizing its capture success. For example, during a six hour foraging bout the egret performed 26 beak dip luring behaviour, fish took the bait 12 times by rushing out towards the dipping site, leading to one successful capture. We are not sure if this behaviour was first learned during the trials in

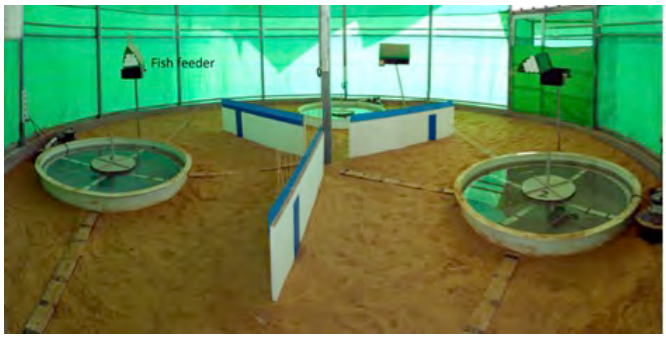

Fig 1. Panoramic view of one experimental arena showing the three equally spaced ponds, 1.52m in diameter and 0.6m in depth. The center of each pool has an opaque disk (18.75 to 36.75 cm radius) that fish can hide under and seek refuge from the foraging predator. The open water represents risky areas where food is available for fish

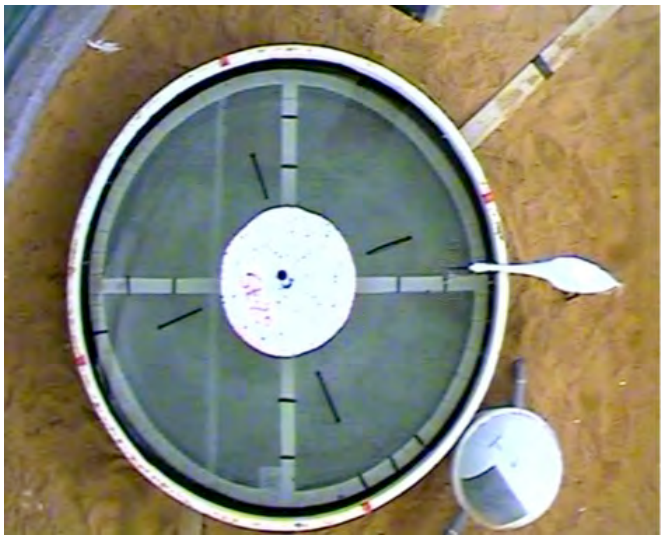

Fig 2. The little egret dipping its beak to lure the prey goldfish out in open from the central cover

the experimental pools (mimicking the fish pellets falling from feeder and creating ripples in water) or was already acquired in the wild. The bird was caught from northern coastal Israel (Ma'agan Michael aquaculture ponds, 32° 33′ 20″ N, 34° 54′ 51″ E). We strongly suspect that the beak dipping mimics food particles falling from the feeder, as the egret performed this behaviour very close to the fish feeder. The pellets fall and float (create ripples) in water at a particular spot in the pool that act as a cue for the fish to come out from the shelter to the open water to feed. As far we know, out of the 16 egrets that participated in the behavioral experiments, only one individual (possibly two) was observed

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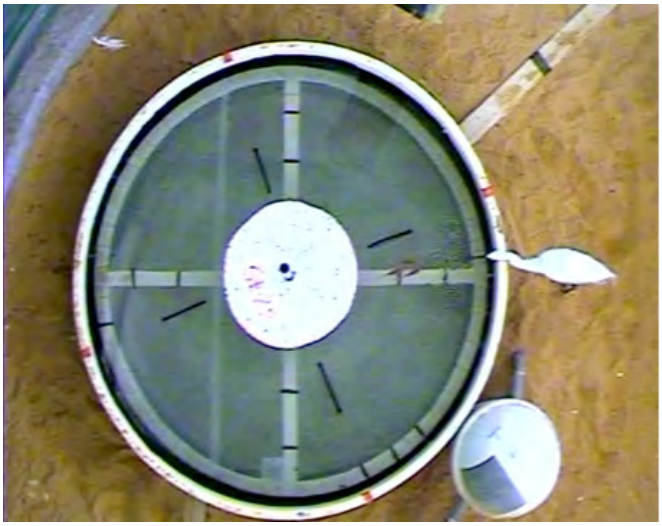

Fig 3. The prey goldfish responds to the beak dipping bait intiated by the little egret

performing this novel behaviour. The luring behaviour through beak dip is clearly differentiated from the bird dipping its beak to drink water, where it raises its head and beak to gulp water. We are not aware if this type of bill dip luring behaviour is recorded in nature, though different behaviours like tongue flicking or bill vibrating has been documented in herons. Egrets have been recorded to keep their beak submerged and vibrate it to attract prey (Kushlan, 1973) or repeatedly open and close its submerged beak to create ripples and trap fish (Tsuboshima 1994). Further, herons (including little egrets) have been documented using external baits (bread pieces) to lure and catch fish in the wild (Post *et al* 2009, Kushlan, 2011).

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